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CDIF SOCIOECONOMIC ANALYSIS
BUTTE-SILVER BOW
BASELINE DATA

July 15, 1978

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CDIF SOCIOECONOMIC ANALYSIS
BUTTE-SILVER BOW
BASELINE DATA

July 15, 1978

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prepared by
THE MONTANA ENERGY AND MHD
RESEARCH AND DEVELOPMENT INSTITUTE, INC.
P.O. Box 3809
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ABSTRACT

The Component Development and Integration Facility (CDIF), a 50 MW_t coal-fired, open-cycle MHD facility, currently is under construction in the Industrial Park at Butte, Montana.

In assessing the environmental impacts of the CDIF, it is necessary to analyze the social and economic impact on the community of Butte. It is our objective to identify, monitor, and appraise the socioeconomic conditions of a community affected by a large-scale application of high technology. This project includes the evaluation of the socioeconomic impact during three phases of project evolution.

	Socioeconomic Schedule	Facility Schedule
Phase I Pre-construction Baseline Data	6/1/77 - 10/1/77	
Phase II Construction Phase	10/1/77 - 1/1/79	4/1/76 - 1/1/77
Phase III Post-Construction/Operation	10/1/78	1/1/79 -

I. OBJECTIVE AND SCOPE OF WORK

This project will monitor the socioeconomic impacts of an advanced technology project on an economically depressed community during three phases of construction. Additionally, the study will provide data source information that will be useful in determining the socioeconomic impact of other potential MHD facilities on a Montana community.

The pre-construction baseline information, accumulation, and assessment phase of this three-phase project was initiated June 1, 1977. It was necessary to gather the baseline data to form the basis upon which changes or effects of the construction of the Component Development and Integration Facility (CDIF) on the Butte-Silver Bow area are to be determined.

Phase I, the pre-construction baseline data, will encompass the following tasks:

A. Community Profile

1. Develop an up-to-date demographic picture of Butte describing existing circumstances of the community.
2. Define the physical and social infrastructure of the Butte-Silver Bow urban area.

3. Define the economic baseline of the Butte-Silver Bow urban area.

B. Construction Project Profile

1. Prepare the Component Development and Integration Facility (CDIF) Specifications Report.
2. Identify the direct site improvement of the CDIF.
3. Determine the CDIF construction schedule.

II. DETAILED DESCRIPTION OF TECHNICAL PROGRESS

A. Community Profile

The fundamental reason for developing a community profile is to have the basic information on the Butte-Silver Bow area as it existed before the construction of the CDIF. It is our purpose to present a clear, concise, and easily understood summary of the social and economic features of the study area compared to the regional, state, or national averages or other appropriate baseline data over a period of time.

1. Historical Background

In order to have a clear picture of the existing circumstances, it is necessary to understand Butte's historical background. Butte began as a gold camp when the first profitable diggings in the area were found in 1864. By the year 1868, the entire valley along Silver Bow Creek was being mined. There was approximately \$350,000 worth of gold yielded in 1868 and 1869; other figures show \$1.5 million worth of gold taken out of Butte by 1870. As the supplies of gold were mined out, quartz became the important product for mining in the area. By 1880, Butte's population had grown, and it became an important center for silver mining.

The beginning of copper mining as a major industry in Butte has been attributed to Marcus Daly. As early as 1882, almost coinciding with Edison's invention of the electric light and the resulting demand for the red metal, copper was being produced in large quantities, and Butte came to be known as a copper center. In the 1880's many smelters were built in the Butte area, which apparently killed much of the vegetation in the immediate area. The fame of Butte as a copper boom town led to continued heavy immigration and growth. It is estimated that by 1890 over 40,000 people lived in the city and the suburbs of Walkerville, Centerville, and Meaderville. That is approximately the population of Silver Bow County today.

It has been reported that Butte grew to an estimated 65,000 people by the turn of the century. Reports tell that at one time there were over 2,700 miles of underground mine tunnels, roughly 12,000 men were employed in the mining industry, and the payroll for one month was around \$1,500,000. Butte's affluent community enjoyed a lively business district, an opera house, and two race tracks (horses). There were numerous mines all around the Butte hill, and the town was made up of

definite nationality sections. The population included thousands of Irish miners who had immigrated from the mines in Cornwall, England, and settled in the Irish community of Walkerville. Italian communities were in McQueen and Meaderville, and a distinctive and impressive Chinatown existed with thousands of Chinese inhabitants.

Mining in Butte is confined to a small area which brought about the consolidation of the mining interests. The Anaconda Company emerged as the controller of the Butte operations.

Mining is, by far, the most important single industry in the county of Silver Bow. Mining activity is centered in the Berkeley Pit, a huge open pit copper mine operation which started in 1955 one mile east of the central business district. The pit has created a significant problem to Butte because it has expanded and engulfed former residential areas of the city and is now at the edge of the uptown business district. Therefore, future mining operations could predict the future of the uptown business district.

2. Demographic Characteristics

a. Population

The population of both Silver Bow County and Butte has declined steadily since the 1920 census (60,313). Although accurate county employment data exists only from 1967 to the present, the population can be traced directly to the level of mining and associated activity in the region.

The decline has been accompanied by high net migration out of the area. Lower than average birth rates and higher than average death rates did not contribute significantly to this decline. The sole explanation for the decrease in population and high out-migration rates can be attributed to a general lack of employment opportunities. Table 1 illustrates population variances since 1950.

b. Migration

The Bureau of Economic Analysis (U.S. Department of Commerce) serves as a source of periodic county migration information. These estimates are based on a ten-percent sample of social security contribution data by county for each employee covered by the program. Comparisons can be made with the place of work (and presumably the place of residence) in different time periods.

TABLE 1.--Population Levels

	<u>Silver Bow County</u>	<u>Butte</u>	<u>State of Montana</u>
1950 ¹	48,422	33,251	591,024
1960 ¹	46,454	27,877	764,767
1970 ¹	41,981	23,368	694,409
1971 ²	42,900	N/A	709,400
1972 ²	42,100	N/A	716,100
1973 ²	43,300	23,750	729,800
1974 ²	43,100	N/A	737,000
1975 ²	43,000	23,476	746,000
1976 ²	41,100P	N/A	753,000
1977 ³	40,900 (Projection)	22,329 (Projection)	
Percent Change			
1950-1975	-11.2%	-29.4% (through '74)	

- Sources:
1. U.S. Bureau of the Census, Census of the Population: 1970, Vol. 1, Characteristics of the Population, Part 28, Montana, U.S. Government Printing Office, Washington, D.C., 1973.
 2. U.S. Bureau of the Census, Population Estimates and Projections, P-25 and P-26 series, Current Population Reports, 1971-1976.
 3. Projections by Western Analysis, Helena, Montana, August 1977, Consultants Report Demographic Baseline and Estimating Procedures.

The most recent time period for which these data are available is 1971 to 1973. In the case of Silver Bow County, the data indicate slight employee net out-migration. During this two-year period, 349 employees from the county found employment in a different region. Based on dependency ratios of both male and female workers, the net change in population would have been a loss of approximately 1100 individuals (i.e., the sum of workers, estimated spouses, and children). Over approximately the same period (1970 to 1973), census estimates of migration also indicated slight out-migration (300 individuals). However, in light of the accuracy of these separate data sources, there is (in all probability) no significant difference between the two estimates. The only realistic conclusion that can be drawn is that net migration rates declined from earlier periods (i.e., from 1.67 percent per year from 1960 to 1970 to .03 percent per year based on 1970 to 1973 census rates).

In general, population levels and migration rates since 1970 for both Butte and Silver Bow County have remained relatively stable, at least with respect to the more pronounced population fluctuations and economic uncertainty in earlier periods. In fact, the county level estimates indicate that slight net in-migration may have occurred from 1973 to 1975. However, the effect of closing underground mining operations in 1975 very likely has ended this short spurt of relative growth. As a result, further out-migration can be expected at least in the immediate future.

c. Age Characteristics

The high level of out-migration, coupled with the general tendency for younger individuals to migrate in proportionately greater numbers, largely explains why the median age in Silver Bow County was somewhat higher than the state level figure in 1970. (Subsequent median age data are not available.) The lower than average concentration of younger age groups is shown in Table 2.

TABLE 2.--Aggregate Age Distribution
(Percent of Total Population)
1970

	<u>Silver Bow County</u>	<u>State of Montana</u>
Under 20 yrs.	38.8%	40.1%
20 - 40 yrs.	20.4%	24.1%
40 - 65 yrs.	28.9%	25.9%
65 and over	11.9%	9.9%
Median Age	30.2 yrs.	27.1 yrs.

Source: U.S. Bureau of the Census, Census of the Population: 1970, Vol. 1, Characteristics of the Population, Part 28, Montana, U.S. Government Printing Office, Washington, D.C., 1973.

3. Inventory of Physical and Social Infrastructure of the Butte-Silver Bow Urban Area

Presently, the supply of public facilities and services in the Butte-Silver Bow urban area is adequate for the existing community (see Figure 1). In this section of the report, the current situation of the community is described; but at this point, we are not attempting to forecast requirements for the future.

a. Housing

The United States Bureau of Census has divided the city of Butte into sixteen census tracts. Nine of the sixteen census tracts have decreased in total housing units since 1970 while the remaining seven census tracts have experienced increases (see Figure 2).

The expansion of the Anaconda Berkeley Open Pit Copper Mine has been one reason for the shift in housing conditions in the Butte area.

b. Government

The 1971 Montana Legislative Assembly created the Constitutional Convention Commission and directed it to assemble and prepare essential information for the Convention. The Constitutional Convention report concerned itself not only with what the present Montana constitution said about local government but how those provisions worked in practice. In addition, constitutional provisions and trends from other states were used for comparative purposes.

In 1971 to 1972, the Constitutional Convention changed the legal posture of local government in Montana by specific language concerning the power and status of cities, towns, and counties.

Through this legislative change, the cities and counties in Montana could elect to change their city's local government (see Figure 3). A unified charter for the city and county of Butte-Silver Bow was adopted by public vote on November 2, 1976. The unified Butte-Silver Bow charter outlines the following functions.

- 1) Self-governing powers. The right to pass local laws for local needs;
- 2) Election of a new 12-member "Council of Commissioners" with legislative power only;
- 3) Election of a full-time "Chief Executive" whose duties will be executive and administrative;

BUTTE - SILVER BOW URBAN AREA

EXISTING COMMUNITY FACILITIES

LEGEND

SCHOOLS	PARKS
PUBLIC	FIRE STATIONS
HIGH SCHOOL	VOLUNTEER FIRE STATIONS
JUNIOR HIGH	LIBRARIES
TEMINETARY	CULTURAL BUILDINGS
PAROCHIAL	GOVERNMENT BUILDINGS
HIGH SCHOOL	HOSPITALS
JUNIOR HIGH	NURSING HOMES
ELEMENTARY	SEWAGE TREATMENT PLANT
COLLEGES	WATER RESERVOIR
PUBLIC & SEMI-PUBLIC	
SCHOOLS	
PARKS	
PUBLIC SERVICE	

Sources: Butte-Silver Bow
City County Planning
Board, 1971
Partially revised by
Butte-Silver Bow
Public Works Dept.,
1977

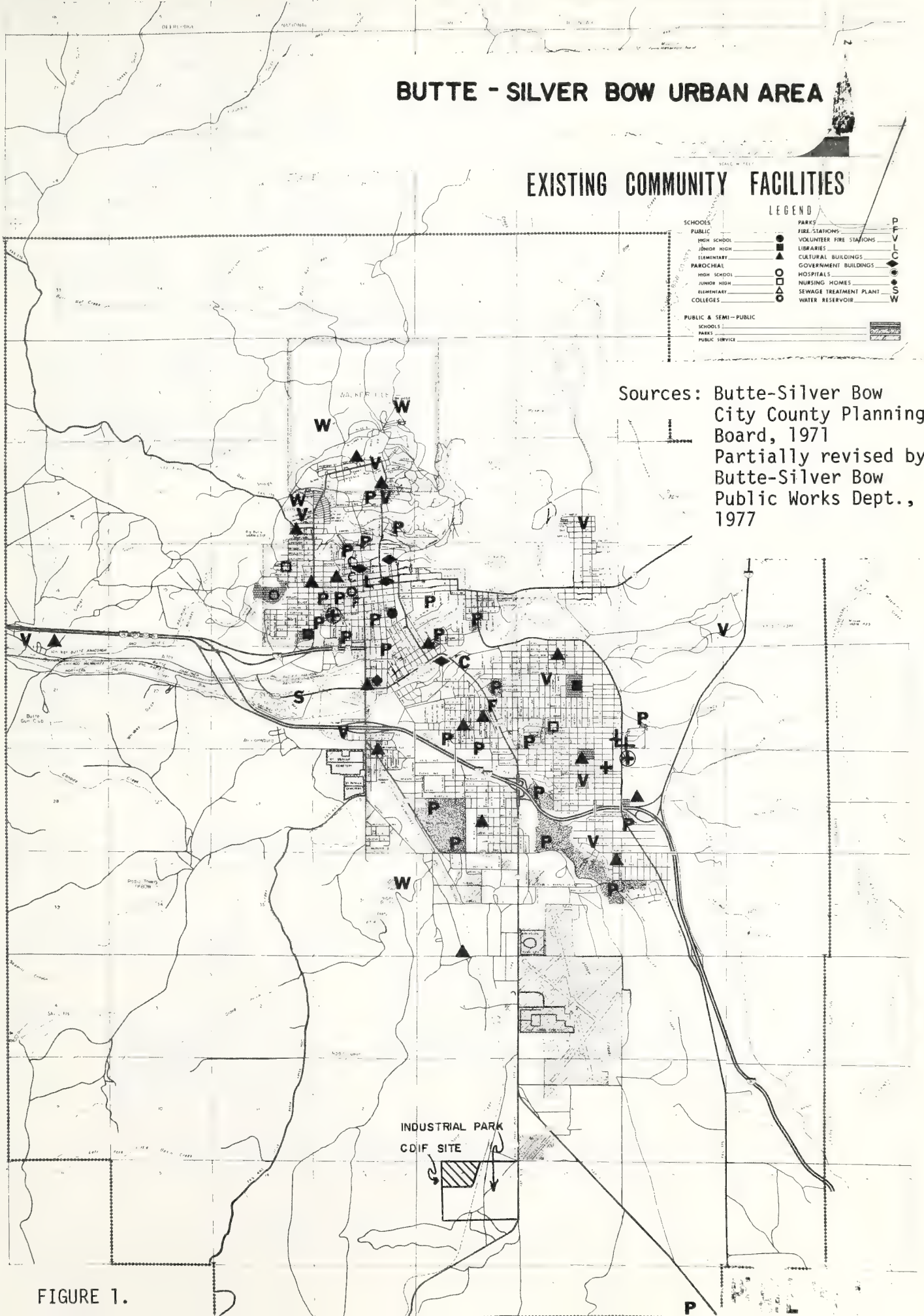
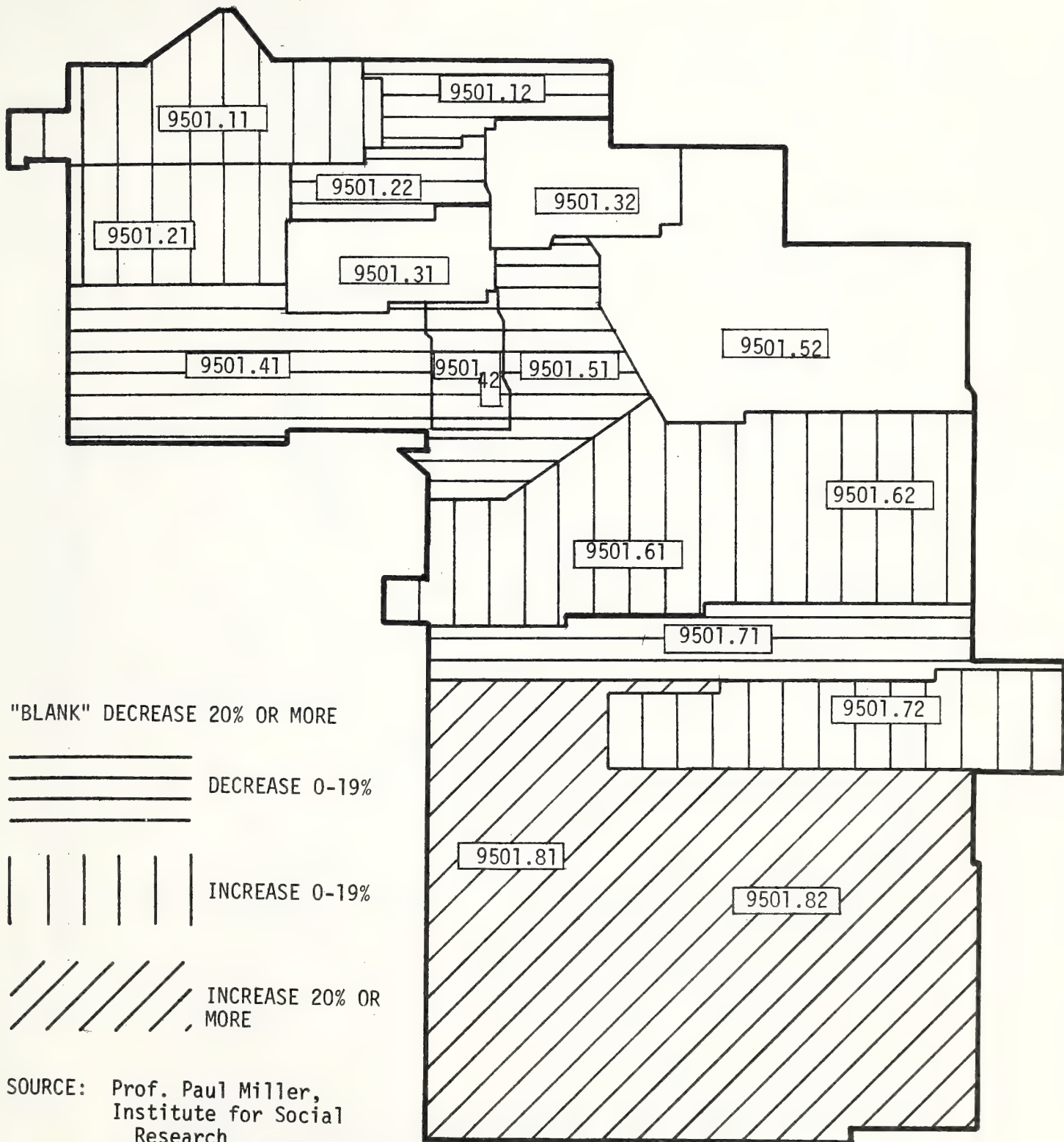


FIGURE 1.

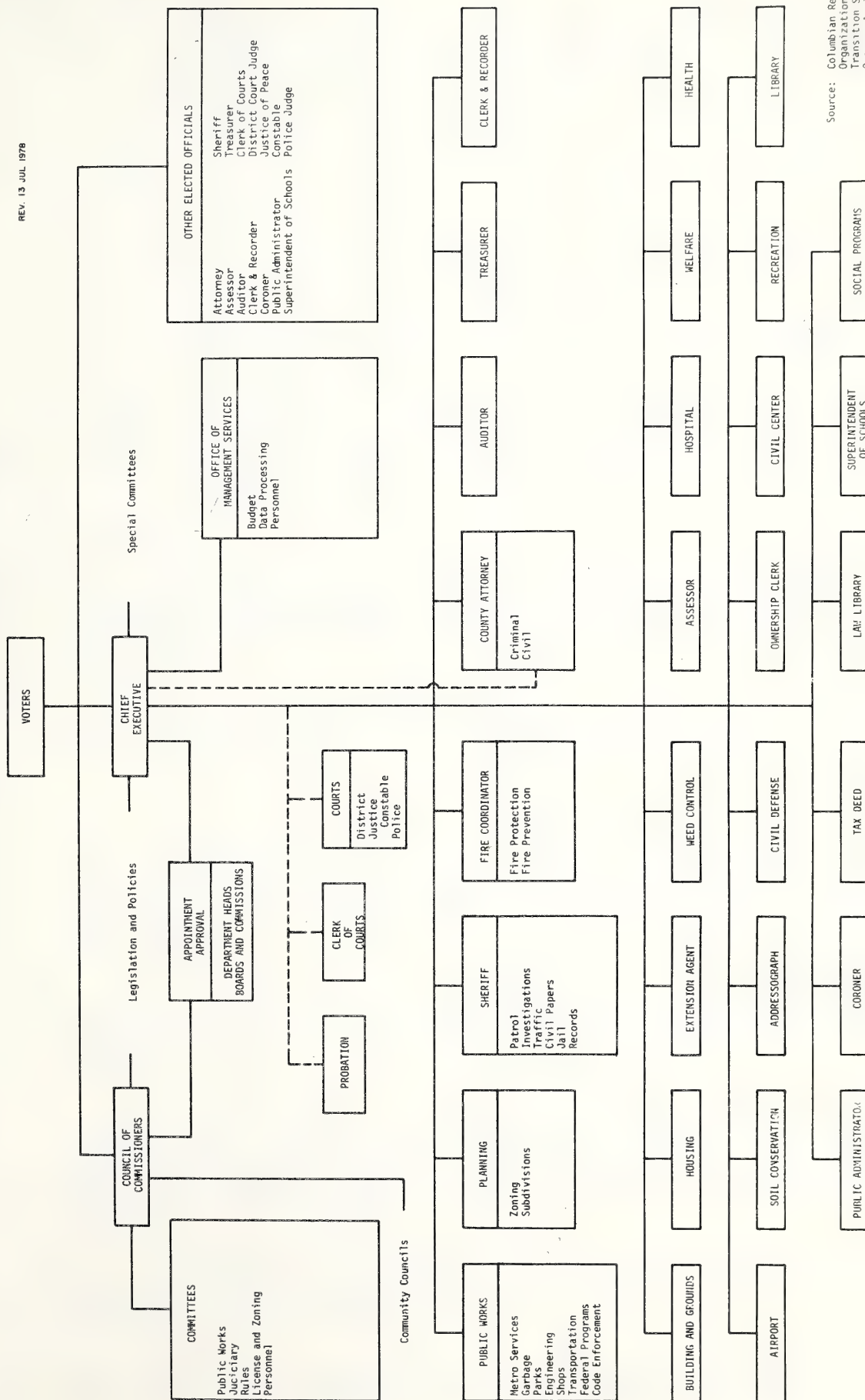


SOURCE: Prof. Paul Miller,
Institute for Social
Research
University of Montana
Missoula, Montana, 1976

FIGURE 2.--Percent Change in Total Housing Stock
Butte Census Tracts

BUTTE-SILVER BOW ORGANIZATIONAL CHART

REV. 13 JUL 1978



Source: Columbian Research Institute,
Organization Management and
Transition Study, Portland
Oregon, April 1977.

1977 2084-C

FIGURE 3.

- 4) Election of sheriff, county attorney, superintendent of schools, clerk and recorder, assessor, auditor and treasurer, clerk of the district court, public administrator, coroner, police judge, justice of the peace, and constables;
- 5) The opening of all meetings and records to the public;
- 6) Taxes to be levied only on basis of service provided;
- 7) Quality fire protection;
- 8) Unified law enforcement under an elected sheriff;
- 9) The combination under Public Works of roads, engineering, parks and recreation, sanitation, and code enforcement;
- 10) Elimination of six-year terms for elected officials; and
- 11) The people of Butte-Silver Bow may amend the charter if it becomes necessary.

c. Land Use

Approximately 93 percent of the land in Butte-Silver Bow is comprised of wood and range land. Although the area is known for its mining industry, only a small portion is used for mining purposes (see Table 3).

A little over half of the land in Butte-Silver Bow is federally owned, while 44 percent is privately owned (see Table 4).

d. Transportation

The Butte-Silver Bow area contains a well-developed transportation system for an area of this size. Butte is located at the intersection of two principal interstate highways: Interstate 90, running east and west, and Interstate 15, running north and south.

Air transportation is available at the Bert Mooney-Silver Bow County Airport, located four miles south of the city limits. Air service is provided by Northwest Orient, Western Airlines, and a charter service.

The Amtrak passenger rail line from Seattle to Chicago passes through Butte providing east and west rail passage. Rail freight service is provided by the Burlington Northern, the Milwaukee, and the Union Pacific railroads. The Butte-Anaconda and Pacific railroad serves local industry.

Intermountain and Greyhound bus lines serve the community and surrounding areas and provide interstate transit service and connections to other major lines.

Figures 4, 5, 6, 7, and 8 show Butte's accessibility to the entire state through the various transportation systems.

TABLE 3.--Land Use - Silver Bow County-1974

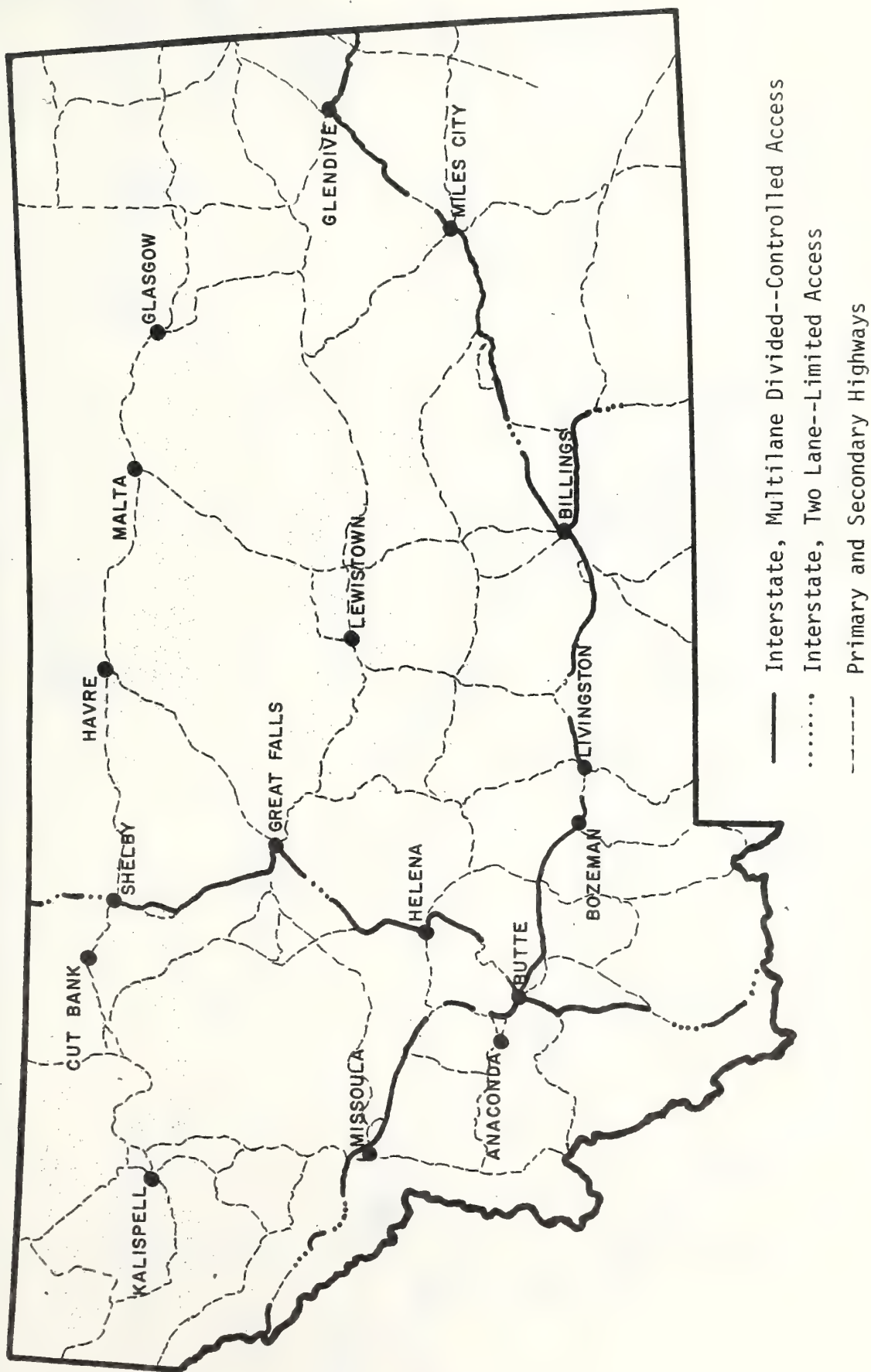
	<u>Acres</u>	<u>% of total</u>
Cropland	5,980	1.3
Pasture	2,000	0.4
Range	207,037	45.2
Woodland	220,987	48.2
Wilderness & Primitive	7,041	1.5
Other (Urban built-up areas, roads, railroads, airports, industrial sites, mine waste, gravel pits)	<u>15,195</u>	<u>3.3</u>
Total	458,240	99.9

Source: U.S. Department of Agriculture, Soil Conservation Service,
Headwaters RC&D Project Plan, Montana, Bozeman, MT, 1974.

TABLE 4.--Land Ownership - Silver Bow County-1974

	<u>Acres</u>	<u>% of total</u>
Federal	238,194	52.0
State	20,249	4.4
Private	<u>199,797</u>	<u>43.6</u>
Total	458,240	100.0

Source: U.S. Department of Agriculture, Soil Conservation Service,
Headwaters RC&D Project Plan, Montana, Bozeman, MT, 1974.



Source: Keck, September 28, 1977

FIGURE 4.

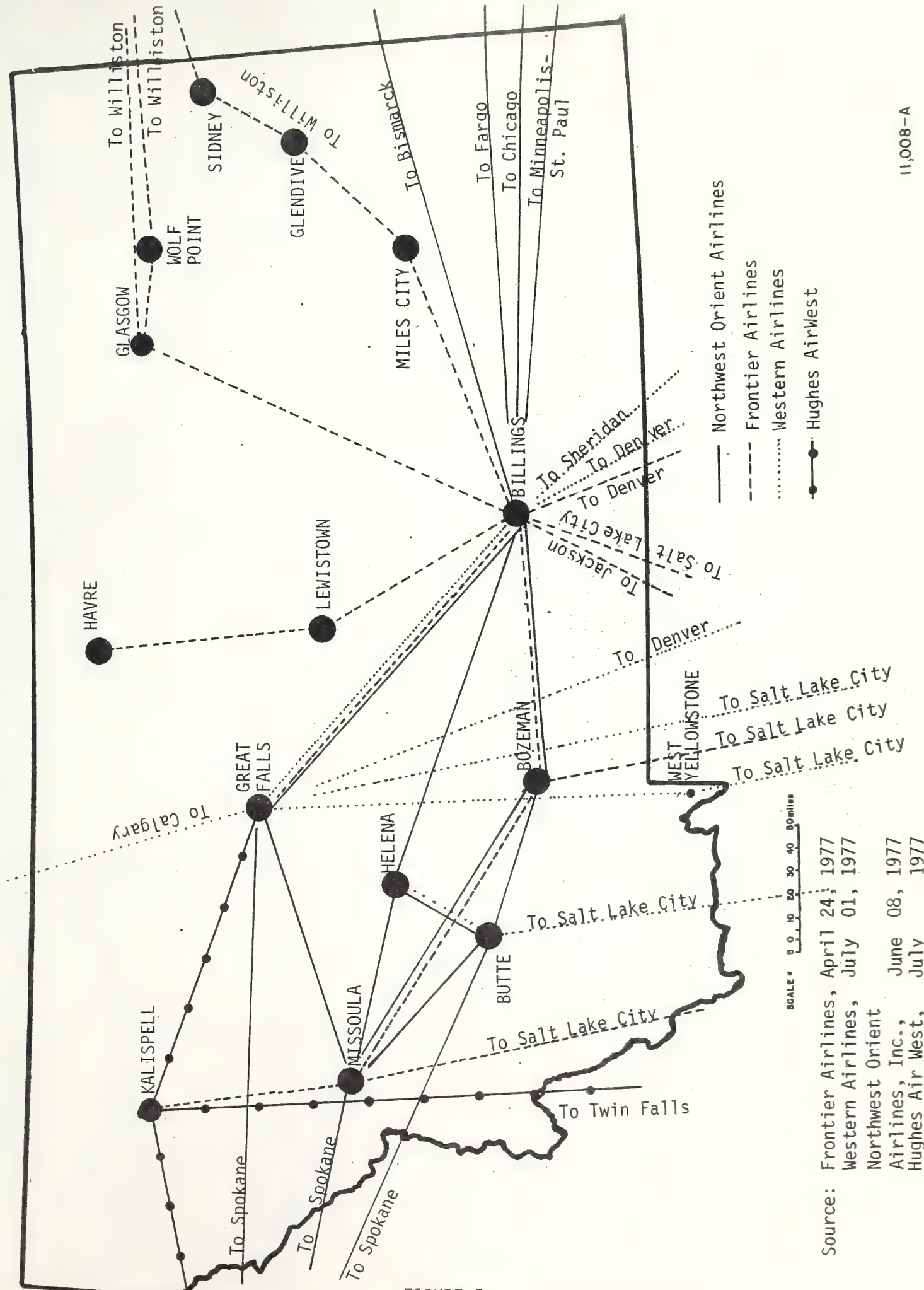


FIGURE 5.

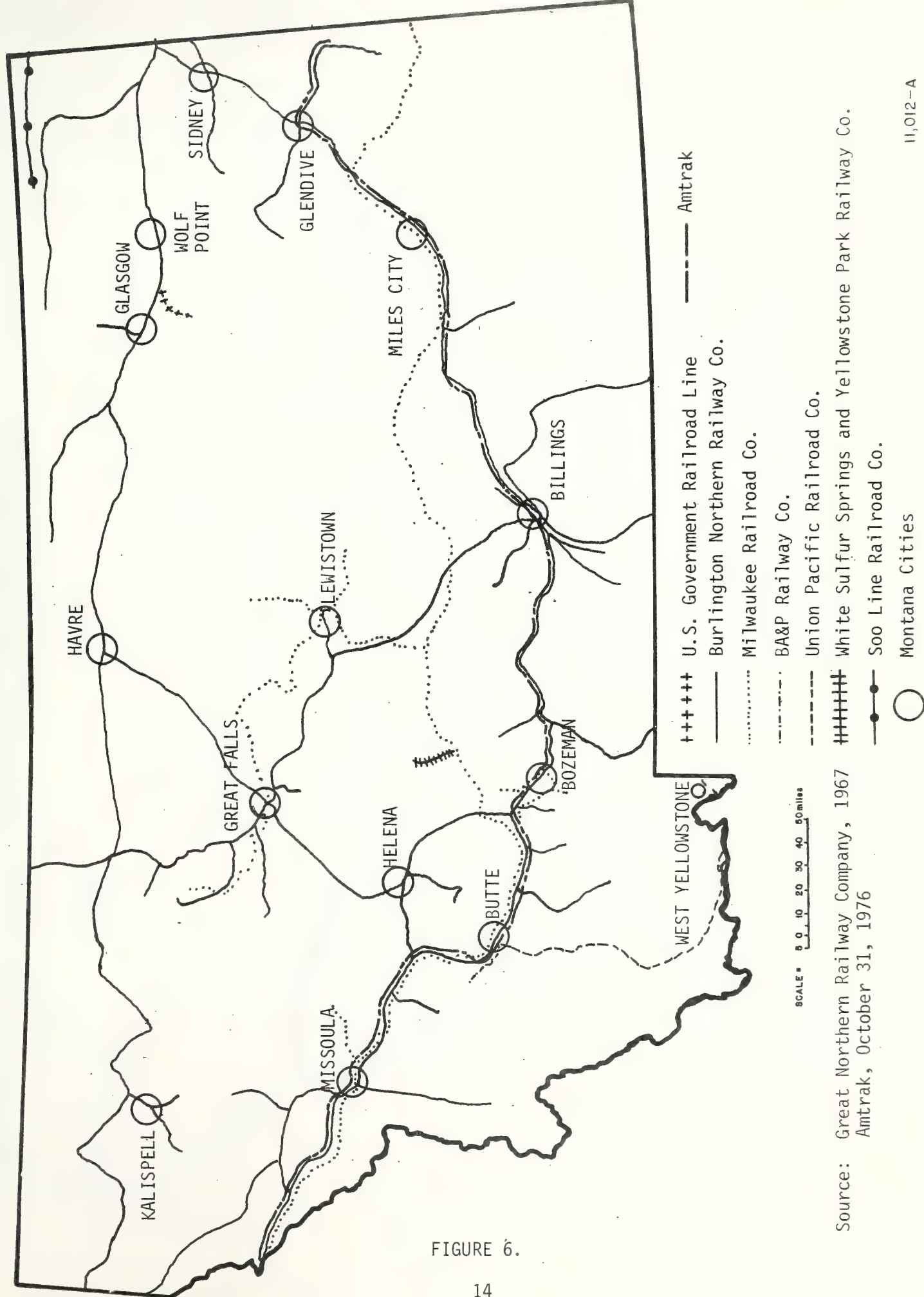
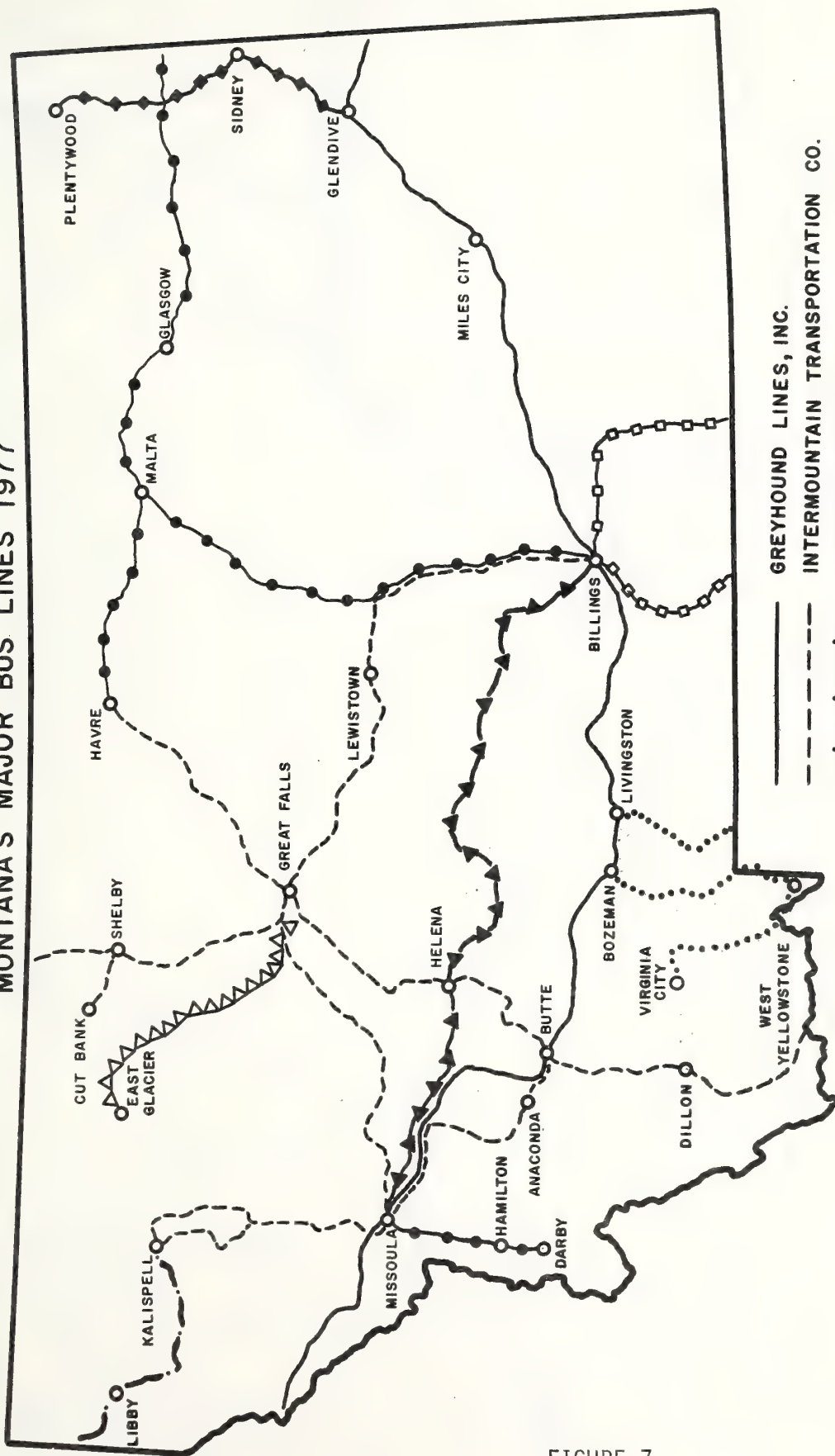


FIGURE 6.

MONTANA'S MAJOR BUS LINES 1977



SCALE : 1" = (APPROX.) 60 MILES

Source: Russell's Guides, Inc.,
June 1977.

FIGURE 7.

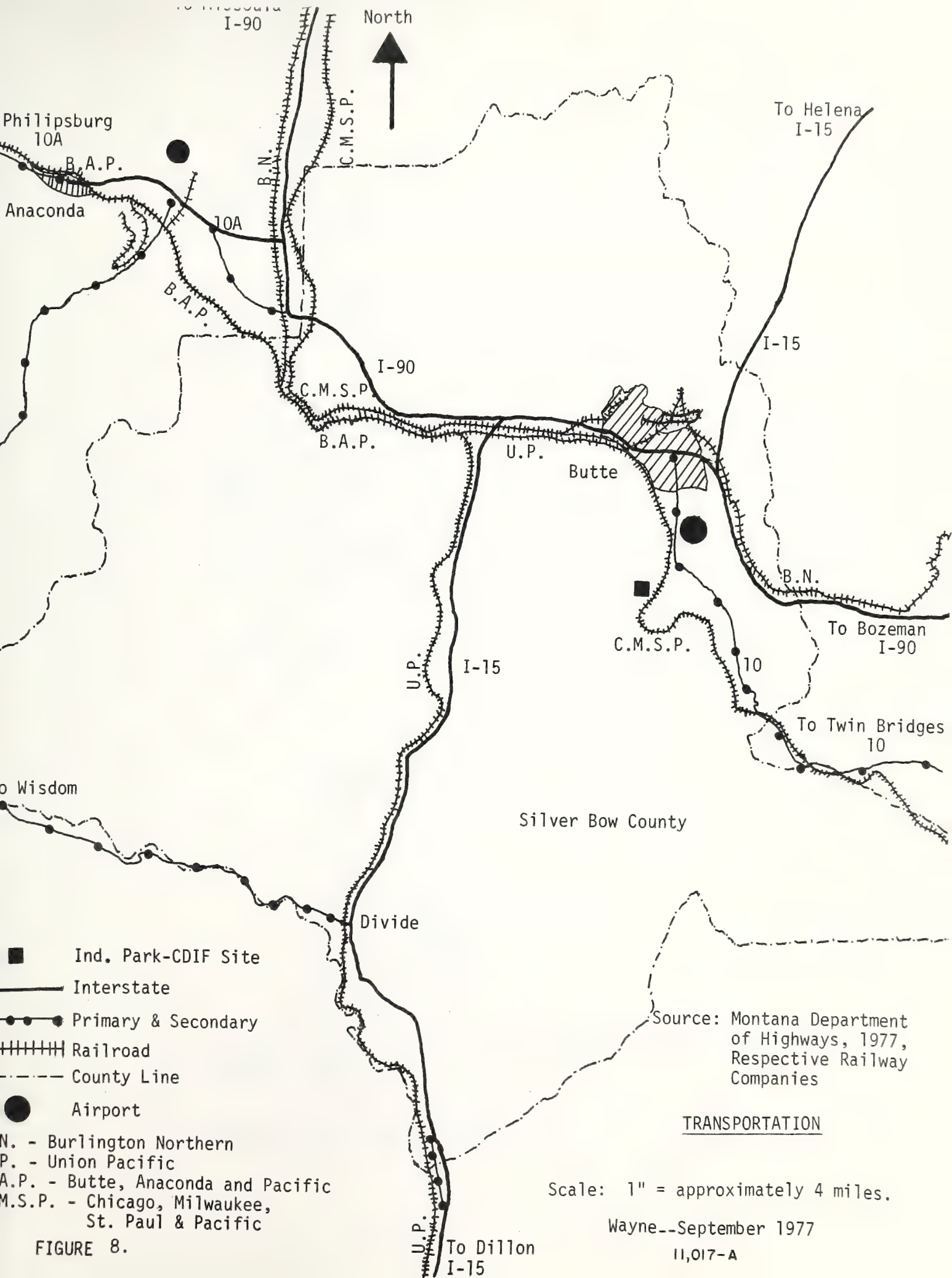


FIGURE 8.

e. Education

The Butte-Silver Bow urban area has put increasing emphasis on the value and quality of education. At the present time, the public school system consists of 16 elementary and three secondary facilities. There also are three parochial secondary schools in the Butte-Silver Bow urban area (see Figure 9).

With the exception of the public secondary schools (East Junior High School and Butte High School), the schools are not operating at full capacity according to state standards (see Table 5). As shown in Table 6, enrollment has decreased steadily since 1973.

The Montana College of Mineral Science and Technology is one of six institutions which comprise the Montana University System and is located in the northwest corner of the urban area overlooking the city. Montana Tech offers a number of facilities for the undergraduate, graduate, and professional person. Total enrollment for Fall 1977 was 1185 students and Spring 1978 was 1043 students. There are 64 teaching faculty members at the college. The 137-acre campus includes the following facilities: 24 lecture rooms; 56 laboratories; one gymnasium; and one library. A new library has been completed, and a physical education complex is under construction.

The Butte Vocational-Technical Center was established in 1969 to provide education and training to meet job requirements in industry, business, professional, and public service sectors.

Programs of study include the following:

- Practical Nursing
- Clerk-Typist
- Stenographer-Secretary
- Bookkeeper-Accountant
- Legal Secretary
- Medical Secretary
- Key Punch Operator
- Electrical Technology
- Civil Engineering Technology
- Automotive Mechanics Technology
- Drafting Technology
- Machine Tool Operation Technology
- Small Engine Repair
- Welding Technology

As of June 30, 1977, the enrollment figure was 571. Vo-Tech also serves approximately 1000 high school students and 1800 adult education students.

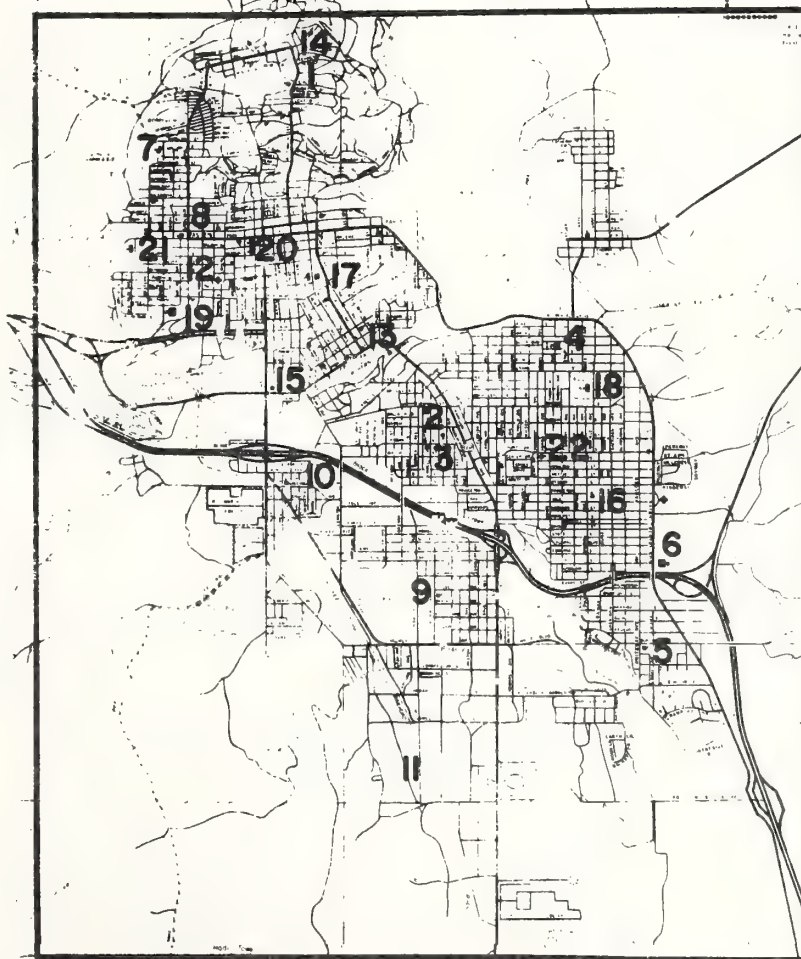
The 35-acre area includes 48,100 square feet for 20 classrooms, shops and laboratories, and a library.

BUTTE-SILVER BOW URBAN AREA

BUTTE PUBLIC SCHOOLS

Source: Community Facilities Plan,
City County Planning Board
(updated 1977)

1. Blaine
2. Emerson
3. Emerson-Annex
4. Greeley
5. Hawthorne
6. Hillcrest
7. Kennedy
8. Lincoln
9. Longfellow
10. Madison
11. Margaret Leary
12. McKinley
13. Monroe
14. Sherman
15. Webster-Garfield
16. Whittier
17. Butte High
18. East Junior High
19. West Junior High
20. Butte Central
21. North Central
22. South Central



Industrial Park

CDIF Site

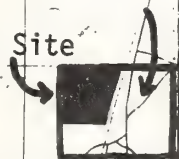


FIGURE 9.

TABLE 5.--Educational Facilities for Butte-Silver Bow

School	Total Enrollment September 1976	Class Rooms	Average Pupils Per Room	Existing Site Area (Acres)
<u>Elementary</u>				
1. Blaine	150	6	25.0	2.0
2. Emerson	367	20	18.4	1.7
3. Emerson - Annex	244	10	24.4	1.4
4. Greeley	351	18	19.5	2.2
5. Hawthorne	241	12	20.1	2.9
6. Hillcrest	377	15	25.1	10.0
7. Kennedy	240	13	18.5	5.5
8. Lincoln	94	6	14.7	0.7
9. Longfellow	301	17	17.7	2.2
10. Madison	121	7	17.3	1.8
11. Margaret Leary	519	20	26.0	12.0
12. McKinley	451	21	21.5	0.7
13. Monroe	179	11	16.3	0.8
14. Sherman	271	10	27.1	0.7
15. Webster - Garfield	344	19	18.1	9.3
16. Whittier	480	22	21.8	9.2
<u>High School</u>				
17. Butte High School	1895	51	37.2	6.1*
18. East Jr. High School	1120	36	31.1	19.5*
19. West Jr. High School	610	23	26.5	13.9
20. Butte Central+	609	31	19.6	1.2
21. North Central+	167	13	12.8	1.2
22. South Central+	273	13	18.2	3.8

*Capacity of pupils per room exceeded

+Parochial Schools

Montana State Student-Teacher)
(recommended-ratio)

Grade	Ratio
Kindergarten	1 to 24
1 - 2	1 to 26
3 - 4	1 to 28
5 - 12	1 to 30

Source: Butte School District No. 1, Butte Central Department of Education, 1977

TABLE 6.--Enrollment Comparisons for Butte Schools, 1973-1976

School	1973 (September)	1974 (September)	1975 (September)	1976 (September)	% Change 73 - 76
<u>Elementary</u>					
Blaine	139	134	129	150	7.3+
Emerson	556	488	407	367	33.9-
Emerson - Annex	280	296	268	244	12.9-
Grant	520	405	-	-	-
Greeley	456	422	412	351	23.0-
Harrison	56	-	-	-	-
Hawthorne	333	342	246	241	27.6-
Hillcrest	429	348	404	377	12.1-
Kennedy	269	258	238	240	10.8-
Lincoln	102	141	148	94	7.8-
Longfellow	381	336	312	301	20.9-
Madison	140	135	133	121	13.6-
Margaret Leary	-	-	537	519	-
McKinley	548	420	466	451	17.7-
Monroe	200	177	165	179	10.5-
Sherman	263	209	217	271	2.9+
Washington	155	265	140	0	100.0-
Webster-Garfield	386	411	340	344	10.9-
Whittier	435	540	490	480	9.4+
<u>High School</u>					
Butte High School	1904	1950	1961	1895	.5-
East Jr. High School	1319	1352	1231	1120	15.1-
West Jr. High School	828	803	709	610	26.3-
Butte Central	643	636	592	609	5.3-
North Central	151	143	142	167	9.6-
South Central	<u>185</u>	<u>197</u>	<u>238</u>	<u>273</u>	<u>32.2+</u>
Total Enrollment	10,678	10,508	9,925	9,404	11.9-

Source: Butte School District No. 1, 1977
Butte Central Department of Education, 1977

f. Libraries

Butte Free Public Library has a total circulation of 147,899, and there are 85,929 titles in the collection (87,348 total volumes). The library currently receives 198 periodicals.

Other libraries available in the Butte-Silver Bow area include the following:

The Anaconda Company Law Library
Montana College of Mineral Science and Technology Library
Butte High School Library
Butte Central Library
Butte Vocational Technical Center Library
East Junior High School Library
West Junior High School Library

g. Recreation

Winter recreation in the Butte area includes such sports as skating, skiing, sledding, and snowmobiling. Numerous ski areas are available within a short driving distance of Butte (see Table 7).

TABLE 7.--Butte Recreation Areas

<u>Area</u>	<u>Approx. Distance from Butte</u>
Beef Trail	7 Miles
Big Sky	125 Miles
Bridger Bowl	107 Miles
Deep Creek	42 Miles
Discovery Basin	50 Miles
Lost Trail	98 Miles
Maverick Mountain	80 Miles
Z-T	16 Miles

The Butte City Recreation Department traditionally has sponsored many recreational activities and currently sponsors 38 different programs throughout the year. The wide variety of programs is designed to reach as many citizens in the community as possible. The city-county recreation and park crews maintain 13 winter ice skating rinks, 14 parks, 1 golf course, 9 baseball-softball fields, and 3 tennis court areas. Crews also maintain swings, teter boards, and slides in 15 locations throughout the city.

Within a 50-mile radius of Butte, there are numerous streams, rivers, and lakes that are used for recreational purposes.

h. Utilities

Butte provides all of the normal city services with the exception of water, storm, and sanitary sewers. The city recently has been providing several programs for community development and community renewal programs. The Community Development of Butte-Silver Bow (CDBS) was started in 1975 and is operated through the Office of Public Works.

The basic function of the CDBS is to improve physical surroundings in diverse areas of Butte-Silver Bow. This includes street construction, housing rehabilitation, park development, installation of fire hydrants, and historical preservation.

The work performed is funded through federal, state, and local funding.

Sanitary and storm sewers are provided by the County Metropolitan Sewer District encompassing Butte, Walkerville, and most of the surrounding urban area (see Figure 10).

The Metropolitan Sewer District (MSD) was formed on December 30, 1964. The governing body of the MSD is composed of the three members of the Board of County Commissioners serving as ex-officio Commissioners of the District. The MSD measure was enacted by the Montana Legislature as a special addition to the rural improvement laws specifically so that federal funding could be obtained for the project.

The District serves the urban area and includes Butte and Walkerville. Costs for establishing the district were defrayed through a special assessment on affected property. Cost of operation, maintenance, and payment of debt service is supported by user fees.

Butte and Walkerville are two of six cities in Montana where water is supplied by private companies. The City of Butte at one time owned the water supply. It was the development of a supply on the Big Hole River which forced the City's water department into receivership in the 1890s. It was then that the Butte Water Company was formed to take over the service of providing water to the Butte area residents (see Figure 11).

The Water Company is a wholly owned subsidiary of the Anaconda Company, controlled by Anaconda's Board of Directors and administered by a vice-president. The rate structure is controlled by the Montana Public Service Commission. The Butte Water Company also supplies water to the City of Anaconda through the Anaconda Water Company, a separate division.

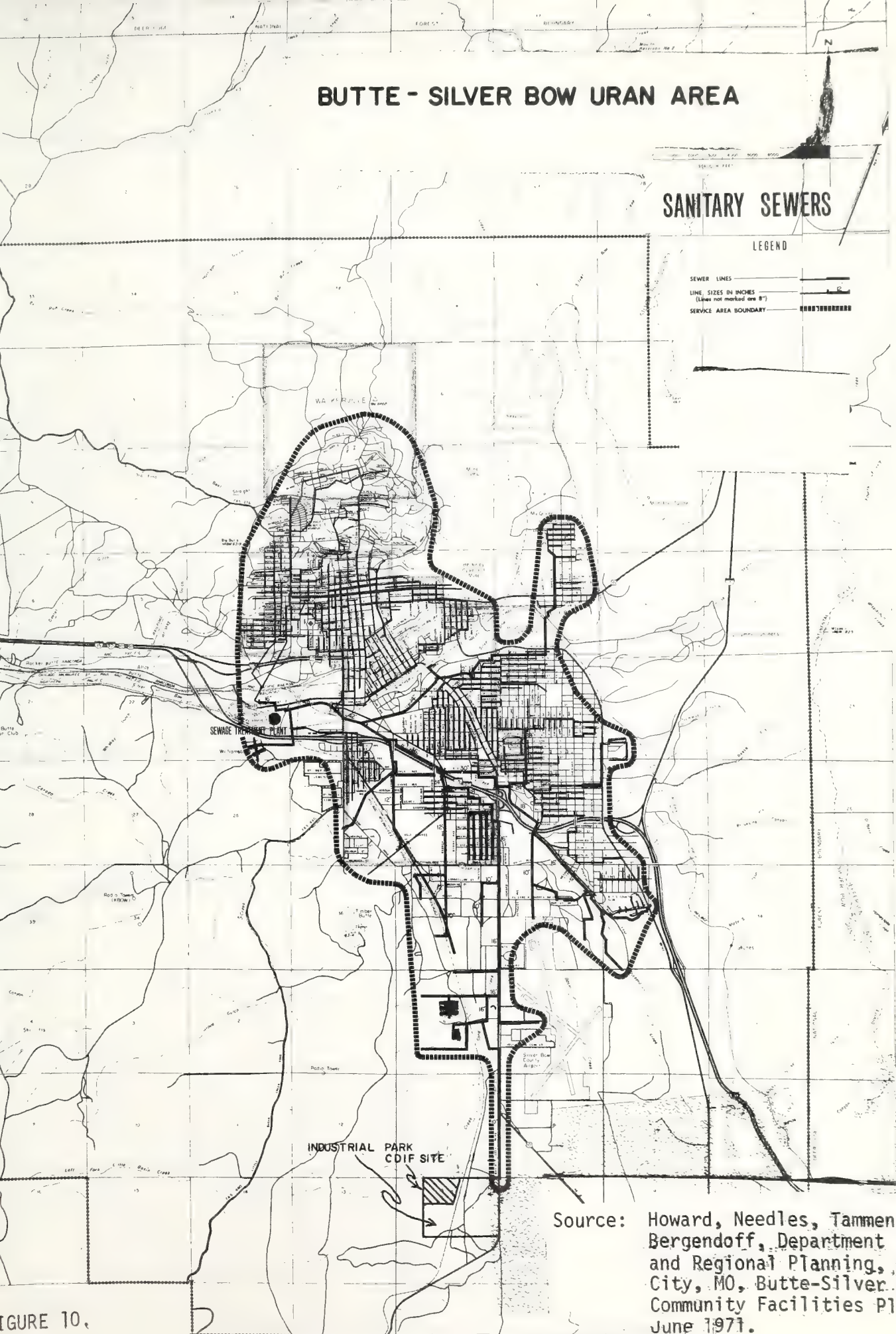
Water charges to users in the entire urban area are similar. Meters are seldom used except for commercial and industrial operations. Residents are charged a flat fee, and the fee is based on the number of rooms and water-consuming facilities within.

BUTTE - SILVER BOW URAN AREA

SANITARY SEWERS

LEGEND

SEWER LINES
 LINE SIZES IN INCHES
 (Lines not marked are 8")
 SERVICE AREA BOUNDARY



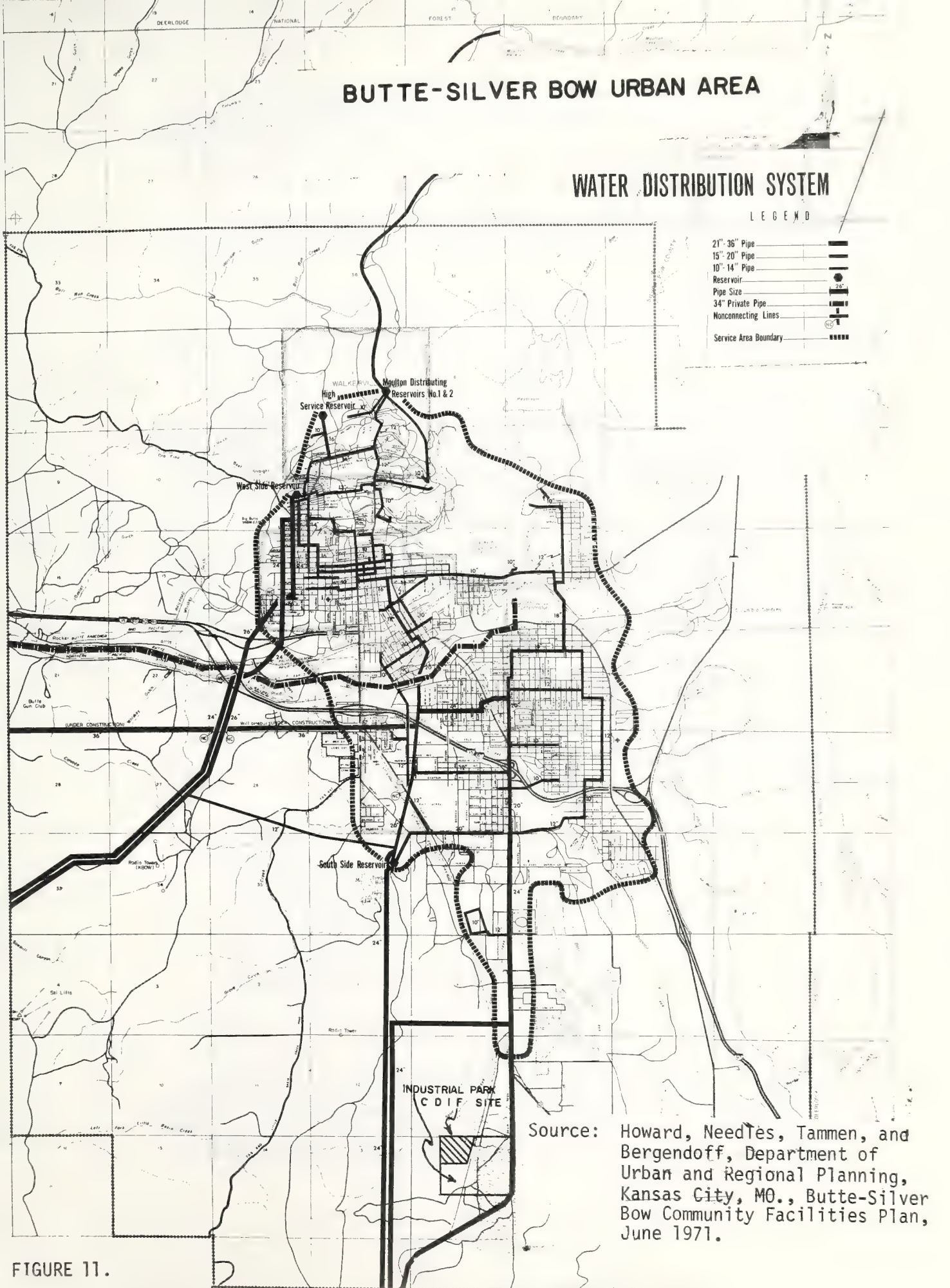
Source: Howard, Needles, Tammen and Bergendoff, Department of Urban and Regional Planning, Kansas City, MO, Butte-Silver Bow Community Facilities Plan, June 1971.

BUTTE-SILVER BOW URBAN AREA

WATER DISTRIBUTION SYSTEM

LEGEND

21" - 36" Pipe	
15" - 20" Pipe	
10" - 14" Pipe	
Reservoir	
Pipe Size	
34" Private Pipe	
Nonconnecting Lines	
Service Area Boundary	



Source: Howard, Needles, Tammen, and Bergendoff, Department of Urban and Regional Planning, Kansas City, MO., Butte-Silver Bow Community Facilities Plan, June 1971.

FIGURE 11.

Fire hydrants belong to the Butte Water Company. The city and the rural fire departments pay for the installation of hydrants and an additional fee each month for maintenance.

i. Fire Protection

The objective of the fire department is to provide the highest level of fire protection possible by means of prevention, suppression, and education.

The fire department consists of 46 employees in addition to the chief, who is responsible for the department's operations. Divisions include suppression, prevention, training, communications, and maintenance.

Basic functions of the fire department include provisions of men and equipment to suppress fires, provision of fire prevention services to safeguard the community from hazards including inspection of public buildings, public education, investigation of the cause, origin, and circumstances of each fire, and delivery of emergency first aid services.

The departmental personnel of the fire department interact with a number of other governmental and private entities including the police department, building inspectors, Butte Water Company, and private ambulance companies. In addition, there is a mutual aid agreement with the volunteer fire departments in the area.

The firemen and members of the Butte Fire Fighters Local 96 of the International Association of Fire Fighters.

There are ten fire districts in the Butte-Silver Bow area (see Figure 12). The following is a list of fire-fighting equipment available in the Butte-Silver Bow area.

- 1 1250-gallon-per-minute pumper
- 8 1000-gallon-per-minute pumper
- 4 750-gallon-per-minute pumper
- 3 500-gallon-per-minute pumper
- 1 5000-gallon tanker
- 2 1500-gallon tanker
- 1 500-gallon tanker
- 1 scope truck (elevating platform)
- 1 60-foot ladder truck

j. Butte-Silver Bow Medical Specialists

Butte has two hospitals and three nursing homes. A-1 Ambulance, Incorporated provides professional 24-hour coach and air ambulance service which includes qualified and medically trained ambulance attendants and incubator service. Information about the daily costs of the two hospitals in Butte are found in Tables 8 and 9.

BUTTE - SILVER BOW URBAN AREA

FIRE DEPARTMENT DISTRICTS

BUTTE CITY FIRE STATIONS

VOLUNTEER FIRE STATIONS

Sources: Butte-Silver Bow
City County Planning
Board, 1971
Revised, 1977
Butte-Silver Bow
Fire Department

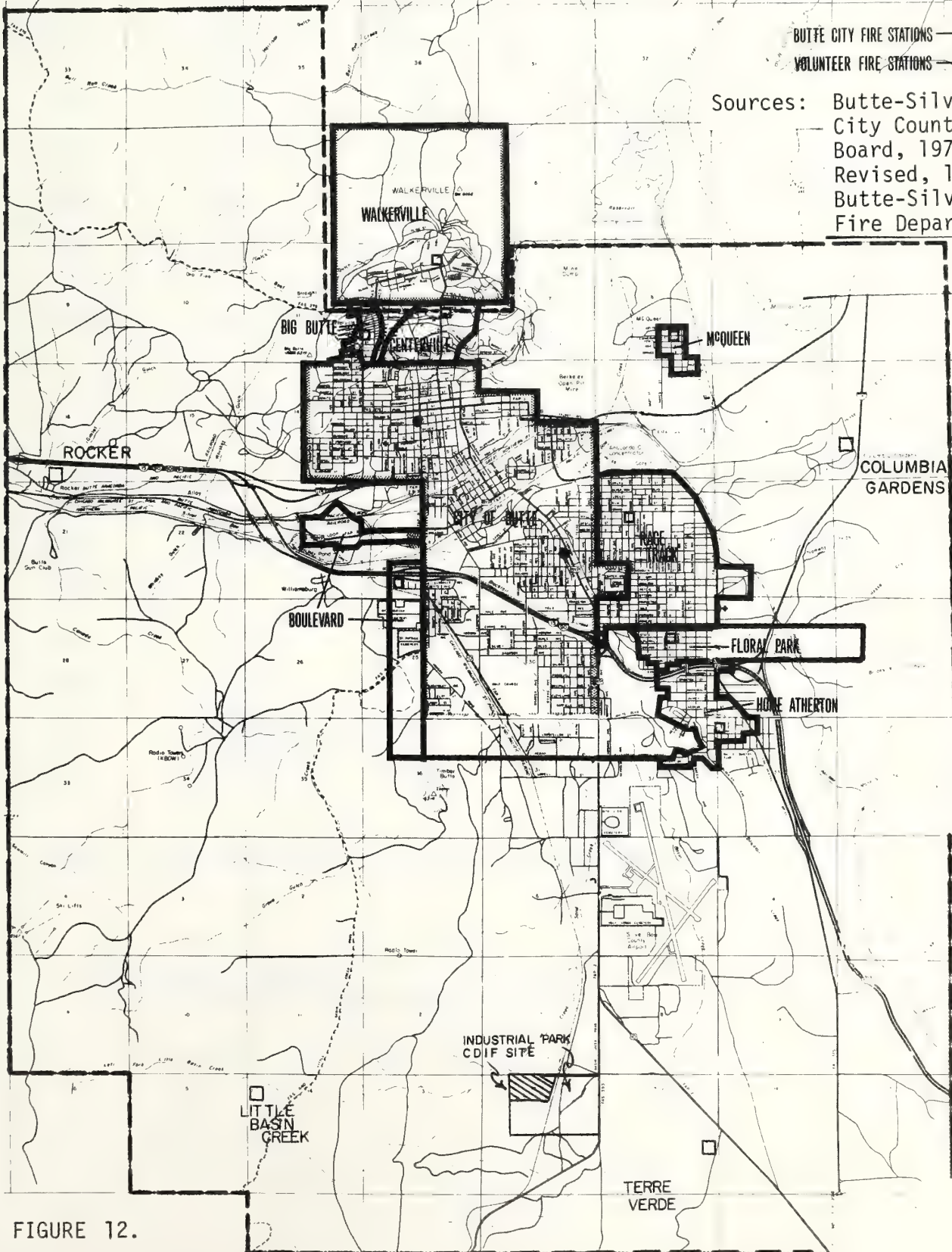


FIGURE 12.

Hospitals

TABLE 8.--St. James Community Hospital Activity, 1972-76
400 South Clark Street
Butte, Montana 59701

<u>Year</u>	<u># Beds</u>	<u>Admissions</u>	<u>Patient Days</u>	<u>% Occupancy</u>	<u>Cost Per Day</u>
1972	180	7172	49,894	75.9	\$ 88.07
1973	180	7170	48,170	73.3	\$ 95.87
1974	180	8299	45,124	66.1	\$107.15
1975	180	8342	46,919	68.63	\$120.99
1976	180	6797	37,775	54.97	\$149.54

Source: St. James Community Hospital Business Office, September 1977

TABLE 9.--Silver Bow General Hospital
Continental Drive
Butte, Montana 59701

<u>Year</u>	<u># Beds</u>	<u>Admissions</u>	<u>Patient Days</u>	<u>% Occupancy</u>	<u>Cost Per Day</u>
1972	142	4363	31,645	61	\$ 49.98
1973	142	3242	22,735	51	\$ 66.81
1974	140	3297	36,408	55	\$ 77.00 **
1975	140 (Sept. 1977) *83 (after Sept. 1977)	3494	18,907	61	\$ 84.00 **
1976	119	3391	15,875	49	\$ 98.00 **

Source: Silver Bow General Hospital Business Office, September 1977

* Third floor closure

** These figures are rough estimates

k. Law Enforcement

Previously, there were two separate law enforcement agencies in Butte-Silver Bow County (city and county). When the governments were unified, the two forces were combined. The Butte-Silver Bow Law Enforcement agency was established to protect life and property from criminal activity and maintain the public peace and safety by enforcing the law.

Presently there are 84 employees, 62 police officers, and 22 civilians employed by the agency. The agency operates 18 squad cars.

The department is divided into the following divisions: patrol, investigation, traffic, jail, records, and community relations.

The basic functions include

- . Enforce applicable laws;
- . Protect lives and property;
- . Serve and execute warrants and other legal documents;
- . Undertake crime prevention and investigation activities;
- . Provide traffic control and a parking meter patrol;
- . Aid the fire department and other emergency teams;
- . Administer a community relations program, including educational programs in the schools; and
- . Maintain appropriate records.

With the exception of the chief, assistant chief, and captain, the officers are members of the American Federation of State, County, and Municipal Employees.

l. Religious Facilities

Butte-Silver Bow urban area has approximately 50 churches of various denominations.

4. Economic Base

The purpose of the inventory of the economic base of the Butte-Silver Bow urban area is to give a general overview and feeling of the economic and population/employment forces that have shaped the area.

Traditionally, Butte's economy has been recognized as being largely dependent on the copper mining industry and associated activities. The economic structure has been non-diversified, and Butte has been at the mercy of the copper markets. The fortunes of copper have gone through several phases of development: new technologies, market instability, and decreasing labor demands. The impact upon the area in employment, income, and economic stability has been immediate and direct.

The efficiency of a local economy is related directly to the stability between the community's basic and non-basic economic sectors. The basic sector provides the input which determines a community's growth or decline. The basic sector generates new income for the community which circulates internally and provides impetus for the development of local business.

Butte's dominant base industry (copper mining) has seen declining employment over the long run. This has not been a smooth transition. Large layoffs, strikes, and mine closures that seemingly are random have created a perpetual state of disequilibrium in the non-basic sector of the community.

The Butte trade area which includes the counties of Silver Bow, Deer Lodge, Madison, Jefferson, and Beaverhead had about 14 percent of its labor force employed in the mining and oil industries in 1970. This number has decreased to date.

At one time, Butte was the largest retail and wholesale trade center in the northern Rocky Mountains. Butte's role as a commercial center began declining around 1920 and has continued its decline, with minor fluctuations, to the present. For example, from 1950 to 1970, there were 237 fewer businesses in operation in Silver Bow County.

Butte recently has made a concentrated effort to diversify the economic base, but the community still remains vulnerable to fluctuations in the mining industry. Butte's many non-mining economic sectors are widespread. Butte is the home of the Montana Power Company's headquarters, a telephone company (Mountain Bell), a chemical plant (Stauffer Chemical), a college (Montana College of Mineral Science and Technology), and numerous federal and state offices. Also located in Butte are railroads, stockyards, and a retail and wholesale market which includes parts of six counties. More recently the developments of the MHD Component Development and Integration Facility (CDIF) and related activities have increased Butte's non-mining economic sectors. The following sections shall provide data on the economic baseline conditions of Butte-Silver Bow.

a. Mining

Butte's basic economic sector (the mining industry) acquired its position when gold was discovered in the Butte area. As the area went from gold and silver to copper mining, Butte grew in size and importance. Today, Butte retains the title of the "Richest Hill on Earth" because of the more than \$20 billion taken out of the ground in mineral production. While the annual amount of copper ore extracted from the Butte mines generally has increased since 1890, the demand for labor generally has decreased since 1920. Open pit mining and other new technologies such as larger and more sophisticated machinery have decreased labor's role in copper production. As the mining industry continues its mechanization, the demand for labor can be expected to continue its decline.

The mining industry is highly unionized. Workers receive relatively high wages in Silver Bow County as a result of the labor unions. Yet, there are drawbacks, such as the strikes that occur periodically. Miners had their first strike in 1876; the most recent strike (over contract negotiations) occurred in the summer of 1977. If a strike lasted for an extended length of time, there is a possibility that it could cripple the entire community.

The Berkeley Pit began in 1955 and today it is the largest truck-operated copper mine in the country. It is the only major mine operation in the Butte area. The Anaconda Company, a wholly owned subsidiary of the Atlantic Richfield Company, is the controller of Butte's mining operations.

The Berkeley Pit has expanded its size so it is now just a few blocks from the uptown business district of Butte.

Although copper is mined in 13 counties in Montana, about 99 percent of the copper production comes from Butte. Montana ranks fourth in the nation in copper production. Silver Bow County mine production for 1973 and 1974 appears in Tables 10 and 11.

b. Agriculture

In the state of Montana agriculture is the largest single "new money" producer. Although Silver Bow County is not an agricultural area, there is a certain amount of agricultural activity. The agricultural statistics for Silver Bow County and the state from 1970 through 1975 are presented in Table 12.

c. Retail Sales

The overall vitality of the local economy determines the levels of retail trade. Therefore, retail trade serves as an indicator of the economic health of a community. The retail sector is in a constant state of change: expanding, contracting, and adjusting to the needs, changes, and alterations in the community.

The retail sector in the Butte area generally has declined for over 50 years. The long-term decline in basic employment directly effects the retail trade sector. The decline of mining, as the economic mainstay of the community, has caused the decline of retail consumption in real dollars.

The number of retail establishments decreased by 29 percent from 1950 to 1970. Constant-dollar gross retail sales declined during the same time by 18 percent. Declines in population are related directly to these declines in the retail trade sector.

TABLE 10.--Butte-Silver Bow Mine Production of
Gold and Silver, 1973, 1974

	<u>1973</u>		<u>1974</u>	
	<u>Gold</u>	<u>Silver</u>	<u>Gold</u>	<u>Silver</u>
Troy Ounces	24,341	4,070,183	24,609	3,259,012
Value	\$2,380,793	\$10,411,529	\$3,931,041	\$15,349,948

TABLE 11.--Butte-Silver Bow Mine Production of
Copper, 1973-1974

	<u>1973</u>	<u>1974</u>
Short Tons	132,282	131,062
Value	\$157,415,831	\$202,621,365

Source: U.S. Department of Interior, Bureau of Mine Minerals Yearbook
1973, 1974

TABLE 12.--Agricultural Statistics

All crops -- Acres Harvested and Value of Crop Production, 1970-1975

	<u>Montana</u>		<u>Butte-Silver Bow</u>		<u>% of State Crop Production</u>
	<u>Acres Harvested</u>	<u>Value of Crop Production</u>	<u>Acres Harvested</u>	<u>Value of Crop Production</u>	
1970	8,198,900	\$287,482,000	6,800	\$267,900	.08
1971	8,717,439	321,472,000	7,440	366,500	.09
1972	8,340,655	449,122,000	7,260	439,700	.09
1973	8,956,755	871,017,000	8,120	760,300	.09
1974	8,969,590	897,916,000	9,120	615,200	.10
1975	9,096,790	929,098,000	7,920	620,400	.09

In the long-term retail trade has declined steadily. Yet, over recent years, retail sales are rising, pointing to a possible slight shift in that sector. Table 13 describes this positive shift over recent years.

The community has experienced major declines in both durable and non-durable manufacturing. The critical areas of decline have been in metal processing and food processing operations. These industries have lost 123 and 205 jobs, respectively.

d. Manufacturing

Manufacturing usually serves as the prime form of basic employment in a normal urban economy. In Butte-Silver Bow, manufacturing traditionally has taken a "back seat" to the mining sector. The number of people employed in manufacturing and the total number of manufacturing firms has declined for several decades. There were 47 manufacturing establishments in 1950 as compared to 34 firms in 1970. These firms employed 1,195 in 1950 and 921 in 1970. Table 14 shows the trends in manufacturing employment.

e. Wholesale Trade

Butte is at the crossroads of the east-west and north-south interstate highways. This location possibly makes Butte the most central major urban area in Montana. Yet, Butte's wholesale trade activity has declined for several decades.

Wholesale trade serves as a supportive function for the productive and distributive activities of other establishments. The level of wholesale trade activity within a community is influenced by industrial development in the area. Wholesale trade is linked directly to the overall economy of the community and is subject to experience the same instabilities that have occurred in the community.

Butte is attempting to encourage and develop the wholesale trade sector. The Port of Butte has been established, and the Industrial Park has been promoted, with wholesaling as an increasingly important sector.

f. Wholesale-Retail Trade Employment

Wholesale and retail sector levels of employment are descriptive of the overall prosperity of the local economy.

From 1950 to 1970 employment in Silver Bow County's trade industries experienced a net decline due to the overall decline of the community's basic industries. In this twenty-year period, retail trade employment was reduced by 18.4 percent, wholesale

TABLE 13.--Retail Sales by Store Group 1974, 1975, 1976

Silver Bow County

Date	Total Retail Sales	Food	Eating and Drinking Places	General Merchandise	Furniture Furnishings Appliances	Automotive	Drug
1974	\$ 129,524,000	\$ 27,547,000		\$ 19,814,000	\$ 6,544,000	\$ 11,409,000	\$ 4,643,000
1975	137,913,000	31,071,000	\$ 12,200,000	20,658,000	6,567,000	12,338,000	4,669,000
1976	156,047,000	36,000,000	12,915,000	23,442,000	7,684,000	15,059,000	5,460,000
<u>Montana</u>							
1974	\$1,961,557,000	\$452,236,000		\$176,050,000	\$86,467,000	\$342,183,000	\$65,263,000
1975	2,031,947,000	491,300,000	\$216,748,000	177,974,000	84,042,000	351,092,000	63,671,000
1976	2,259,754,000	54,896,000	233,867,000	197,078,000	96,026,000	447,110,000	72,701,000

Total retail sales have increased as have all of the areas of retail sales for the period 1974 through 1976.

Source: Sales Management--Survey of Buying Power, July 1975
Sales and Marketing Management Magazine--Survey of Buying Power, July 1976, July 1977

TABLE 14.--Manufacturing Employment

Silver Bow County
1950, 1960, 1970

	Number of Persons Employed			% Change 1950-1970
	<u>1950</u>	<u>1960</u>	<u>1970</u>	
Furniture and Lumber and Wood Products	55	90	65	15.4+
Metals Industries	275	191	152	44.7-
Machinery Except Electrical Equipment	70	48	38	45.7-
Electrical Equipment Machinery and Supplies	12	24	11	8.3-
Transportation Equipment	9	4	5	44.4-
Other Durable Goods	75	39	45	40.0-
Food and Kindred Products	358	317	153	57.3-
Textiles and Fabricated Textile Products	15	--	--	--
Printing, Publishing, and Allied Products	272	284	235	13.6-
Chemicals and Allied Products	32	237	189	83.1+
Other Nondurable Goods (including not specified manufacturing industries)	<u>22</u>	<u>52</u>	<u>28</u>	21.4+
Total	1195	1286	921	29.8-

Source: United States Census of Population, General, Social, and Economic Characteristics 1950, 1960, 1970. U.S. Bureau of Census, Dept. of Commerce

trade employment was reduced by 35.8 percent of its total, and the entire Butte community employment declined by 21.9 percent. The trends in wholesale and retail employment 1950 to 1970 are shown in Table 15.

g. Transportation, Communication, and Utilities Sector

Essential functions to the operation of a community's economy are provided by the transportation, communication, and utility sectors. Table 16 describes the changes in employment from 1950 to 1970.

h. Employment

Employment patterns are a direct indicator of economic stability in a community. Employment in the Butte area is known to be unstable due to the fluctuations in the mining industry. As pointed out in Table 17, the total labor force and employment has been erratic since 1971.

Traditionally the local economy has been dependent on the copper mining industry and associated activities. While the actual amount of copper ore extracted from the Butte mines has increased since 1890, employment in the industry has decreased steadily since 1920. This decline can be attributed to advancements in technology, the opening of the Berkeley Open Pit Mine, and the closure of the underground mines.

The effects of the bleak copper industry has not been the only blow to the Butte-Silver Bow employment market; the telephone company recently announced the transfer of its operator service to Helena.

i. Income

Butte-Silver Bow tends to parallel the state of Montana in income statistics. The median personal and per capita income levels are slightly lower than state averages. Because the large population areas are urban it is more realistic to compare the major population centers of Montana.

Butte-Silver Bow has the lowest median family income of the state urban areas but ranks second in the median income per family member category (see Table 18).

About 40 percent of Butte-Silver Bow's population is on a fixed income. This number is high because of the number of old or ill people. Fixed income is defined as those heads of households who receive no income from employment. These figures are estimated and do not take into account employment of wife, children, or other members of the household (see Table 19).

TABLE 15.--Wholesale and Retail Employment - Silver Bow County 1950, 1960, 1970

	Retailment Employment		% Change 1950-1970		Wholesale Employment		% Change 1950-1970		Total County Employment		% Change 1950-1970	
	1950	1960	1970		1950	1960	1970		1950	1960	1970	
Employment	3,415	2,887	2,786	-18.4	909	740	534	-35.8	18,632	15,399	14,543	21.9
Percent of Total County Employment	18.3	18.7	19.2		4.9	4.8	4.0		100.0	100.0	100.0	

TABLE 16.--Number of People Employed in Transportation,
Communications, and Utilities Sectors

Silver Bow County 1950, 1960, 1970				
	<u>1950</u>	<u>1960</u>	<u>1970</u>	<u>% Change 1950 - 1970</u>
Transportation	1150	754	499	56.6-
Communications	172	297	219	21.5+
Utilities	<u>388</u>	<u>432</u>	<u>527</u>	26.4+
Total	1710	1483	1245	27.2-

Source: United States Department of Commerce, Bureau of the Census,
Census of the Population, General, Social, and Economic
Characteristics, 1950, 1960, 1970.

TABLE 17.--Butte-Silver Bow Annual Employment Averages 1971-1977

	<u>Labor Force</u>	<u>Employed</u>	<u>Unemployed</u>	<u>Unemployment Rate</u>
1971	16,371	15,057	1,314	8.0
1972	16,674	15,890	984	5.9
1973	17,254	16,288	965	5.6
1974	18,404	17,197	1,207	6.7
1975	18,144	16,263	1,881	10.4
1976	17,984	15,833	2,151	12.0
1977	17,167	15,618	1,549	9.0
(May 1978)	17,222	15,769	1,458	8.5

TABLE 18.--Average Income per Family Member 1970

Montana Urban Communities

	<u>Median Family Income</u>	<u>Median Family Size</u>	<u>Median Income Per Family Member</u>
Billings	\$ 8,966	3.1	\$2,892
Butte-Silver Bow	\$ 8,670	2.9	\$2,990
Great Falls	\$ 8,952	3.2	\$2,789
Helena	\$10,025	3.0	\$3,342
Missoula	\$ 9,052	3.2	\$2,829

Source: U.S. Bureau of the Census, Department of Commerce, County and City Data Book, 1972.

TABLE 19.-- 1976 Fixed Income Data for Butte-Silver Bow

Census Tract (Refer to Figure 2)	Total Number Living on Fixed Income	Percentage Living on Fixed Income
9501.11 North West	244.800	0.415
9501.12 North Central	135.300	0.559
9501.21 West of CBD	161.000	0.311
9501.22 Central Business District	349.800	0.579
9501.31 South of CBD	207.500	0.403
9501.32 East of CBD	167.400	0.562
9501.41 Lower West Side	330.000	0.418
9501.42 Center of Town	163.200	0.533
9501.51 South of CBD	364.900	0.547
9501.52 South of Berkeley Pit	80.000	0.417
9501.61 South Central	396.000	0.473
9501.62 South Central	127.200	0.316
9501.71 South Central	160.800	0.329
9501.72 South Central	254.200	0.360
9501.81 South West Corner of City	98.000	0.317
9501.82 South East Corner of City	451.400	0.468
Big Butte	151.900	0.443
Walkerville	148.800	0.470
Centerville	150.400	0.516
Race Track	785.900	0.330
Floral Park	98.600	0.288
Home Atherton	172.000	0.233
Boulevard	169.000	0.310
Rocker	44.800	0.255
Cont. or Terra Verde	16.500	0.102
Melrose, Divide, Buxton	48.000	0.408
McQueen - East Butte	13.000	0.500
Total	5,486.700	0.3958

Source: Dr. Paul Miller, Institute for Social Research,
University of Montana, Missoula, Montana, 1970
and 1976 Butte Housing Studies.

Butte-Silver Bow has an average gross annual income per household of \$11,555, an average of \$5,031 per capita income, and an average annual net income per household of \$9,050. Table 20 indicates the census tract breakdown in Butte. The areas which have high gross incomes are located south of the Butte business district and are experiencing growth in new housing.

Table 21 indicates the total labor and proprietor's income by place of work for the years 1970 to 1975. Total labor and proprietor's income generally increased with the exception of 1971.

Effective buying income is defined as the total dollar amount available to the community or household for the purpose of purchasing commodities or services. The majority of households in the Butte-Silver Bow area are in the \$8,000 or less per year group. As expected, effective buying income generally increases from year to year (see Table 22).

j. Welfare

The following information (Tables 23 and 24) concerning aid-to dependent children, medical assistance, and food stamps for Silver Bow County was provided by the State Social and Rehabilitation Services.

k. Taxes

Montana taxes include individual taxes, corporate income taxes, and property taxes; there is no general sales tax, and all motor fuel taxes are earmarked for highway construction and maintenance.

Approximately 60 percent of the total state and local tax collections are generated through property tax. About 95 percent of the property tax revenue goes directly to the counties, cities, and school districts in which they are generated.. All other taxes are collected by the state except for 25 percent of the personal and corporate income tax revenue which is earmarked for local schools. See Table 25 for breakdowns and valuation of Silver Bow County taxation.

Mining operations are not taxed on an ad valorem basis except for limited items such as above-ground structures and certain above and underground machinery. In lieu of an ad valorem tax on other aspects of mining operations, a net proceeds tax is levied. The net proceeds of the mines are calculated according to a statutory formula, and this amount is spread on the assessment role and is taxed at the same rates as real and personal property. In Butte-Silver Bow, the principal recipients of the net proceeds tax are Silver Bow County and School District No. 1.

TABLE 20.--1976 Income Data Butte-Silver Bow

Census Tract (Refer to Figure 2)		Average Gross Annual Income Per Household (\$)	Average Per Capita Income (\$)	Average Net Annual Income Per Household (\$)
9501.11	North West	\$ 13,034.47	\$ 5,515.74	\$10,021.72
9501.12	North Central	9,219.91	4,956.10	7,655.13
9501.21	West of CBD	11,201.77	4,939.64	8,701.61
9501.22	Central Business District	8,090.14	4,422.42	7,088.63
9501.31	South of CBD	8,480.85	5,300.55	6,305.37
9501.32	East of CBD	7,030.04	5,456.32	5,570.60
9501.41	Lower West Side	12,579.90	5,702.42	9,318.62
9501.42	Center of Town	10,609.28	4,711.62	8,314.42
9501.51	South of CBD	7,701.60	3,777.29	6,398.13
9501.52	South of Berkeley Pit	9,922.97	4,353.24	7,771.20
9501.61	South Central	7,220.55	4,231.03	5,874.19
9501.62	South Central	13,045.66	5,480.48	10,092.79
9501.71	South Central	11,736.30	4,962.69	9,444.70
9501.72	South Central	12,657.49	5,376.84	10,521.53
9501.81	South West Corner of City	11,669.95	4,259.72	9,054.08
9501.82	South East Corner of City	9,938.5	4,123.43	7,880.67
Big Butte		11,453.94	5,170.16	9,201.31
Walkerville		8,077.91	3,796.24	6,428.24
Centerville		7,473.47	3,254.34	6,351.42
Race Track		13,112.53	5,421.75	9,848.79
Floral Park		15,606.49	6,308.73	12,255.46
Home Atherton		18,723.28	6,555.74	14,383.13
Boulevard		13,175.48	5,120.71	10,400.58
Rocker		12,501.65	4,906.72	9,807.20
Continental Drive Terra Verde		16,073.06	4,483.71	12,296.00
Melrose, Divide, Buxton		11,599.53	4,709.51	9,888.45
McQueens - East Butte		10,298.07	5,506.29	9,579.57
For Entire Population		\$ 11,555.52	\$ 5,031.83	\$ 9,050.36

Source: Dr. Paul Miller, Institute for Social Research, University of Montana, Missoula, Montana, 1970 and 1976 Butte Housing Studies

TABLE 21.--Total Labor and Proprietor's Income by Place of Work*

	1970	1971	1972	1973	1974	1975
By Type						
Wage and salary disbursements**	\$ 94,427,000	\$ 94,774,000	\$110,655,000	\$125,140,000	\$137,880,000	\$144,531,000
Other labor income	7,411,000	6,201,000	7,420,000	8,450,000	8,852,000	9,164,000
Proprietor's income	9,140,000	9,022,000	7,767,000	9,656,000	11,370,000	12,087,000
Farm	-24,000	-125,000	120,000	-31,000	-346,000	-547,000
Non-farm	9,164,000	9,147,000	7,647,000	9,687,000	11,716,000	12,634,000
By Industry						
Farm	73,000	-19,000	236,000	97,000	-189,000	-404,000
Non-farm	111,905,000	110,016,000	125,606,000	143,149,000	150,521,000	166,186,000
Private	97,047,000	93,713,000	107,739,000	123,301,000	136,803,000	141,429,000
Manufacturing	5,720,000	5,719,000	5,913,000	6,731-000	7,547,000	7,802,000
Mining	35,715,000	30,476,000	40,695,000	44,644,000	49,105,000	46,011,000
Contract construction	4,983,000	5,364,000	5,603,000	7,258,000	6,490,000	5,571,000
Wholesale and retail trade	22,398,000	24,242,000	26,519,000	29,839,000	33,927,000	37,383,000
Finance, insurance, and real estate	4,032,000	3,951,000	3,883,000	4,053,000	3,886,000	4,162,000
Transportation, communications, and public utilities	6,606,000	7,648,000	8,210,000	9,246,000	10,351,000	11,294,000
Services				21,114,000	25,061,000	29,015,000
Other industries				416,000	436,000	191,000

Government	\$ 14,854,000	\$ 16,303,000	\$ 17,867,000	\$ 19,848,000	\$ 21,718,000	\$ 24,757,000
Federal						
Civilian	3,774,000	3,859,000	4,255,000	4,506,000	4,553,000	5,269,000
Federal						
Military	729,000	729,000	880,000	976,000	1,026,000	1,048,000
State and local	10,355,000	11,652,000	12,732,000	14,366,000	16,139,000	18,440,000

* Equals the sum of wages, other labor income and proprietor's income

** Primary source for private, non-farm wages

Source: U.S. Department of Commerce, Regional Economics Information System (REIS),
Bureau of Economic Analysis, 1977.

TABLE 22. -Percentage of Households by Effective Buying Income Group
in Butte Silver-Bow

Date	Total Effective Buying Income	Median Household Effective % Buying Income	Less than \$8,000	\$8,000 to \$9,999	\$10,000 to \$14,999	\$15,000 to \$24,999	\$25,000 and over
<u>Silver Bow County</u>							
1975	\$189,968,000	\$11,003	35.6	8.9	26.5	27.7	4.3
1976	\$207,940,000	\$12,043	32.8	7.5	24.7	28.4	6.6

Source: Sales and Marketing Management, Magazine Survey of Buying Power,
Ken Reiss Publisher, New York, N.Y., July 1976 and July 1977.

Table 23

Welfare Assistance - Butte-Silver Bow

	<u>Aid to Dependent Children</u>	<u>Medical Assistance</u>	<u>Food Stamps</u>
	(Amount of Benefits)	(Amount of Benefits)	(Average Cases)
1972	\$ 901,987	\$ 980,117	1,202
1973	893,665	1,126,700	1,098
1974	877,536	1,334,389	1,105
1975	846,404	2,023,281	1,147
1976	995,989	2,887,539	1,019
1977 (January-June)	481,033	2,056,405	984

TABLE 24

Total Expenditures for Public Assistance and Medical Care
Selected Months of 1977 Compared to State Totals

<u>Butte-Silver Bow</u>								
	<u>Total</u>	<u>% of State Total</u>	<u>Aid to Dependent Children</u>	<u>% of State Total</u>	<u>Medical Assistance Medicaid</u>	<u>% of State Total</u>	<u>Gen. Asst. and County Medical</u>	<u>% of State Total</u>
March '77	\$ 625,628	13.7%	\$ 81,721	7.8%	\$ 330,776	10.7%	\$213,131	49.5%
April '77	\$ 549,261	11.2%	\$ 77,344	7.6%	\$ 272,576	8.2%	\$199,341	36.9%
<u>Montana</u>								
March '77	\$4,575,765		\$1,046,459		\$3,098,648		\$430,658	
April '77	\$4,890,912		\$1,019,254		\$3,331,187		\$540,471	

Source: Montana Department of Social and Rehabilitation Services, Statistics and Research Bureau, Helena, MT, September 1977.

TABLE 25.--Silver Bow County Top Taxpayers

	<u>1974</u>	<u>1975</u>	<u>1976</u>	<u>1977</u>
Silver Bow County total tax tab	\$14,079,644	\$14,098,857	\$16,392,620	\$12,984,654
Top ten taxpayers	6,407,874	7,139,717	9,143,307	5,011,206
Anaconda Company	4,404,086	4,985,668	6,642,666	3,579,608
Montana Power Company	769,460	722,240	1,020,772	773,003
Mountain Bell	303,269	478,036	411,112	488,224
Safeway	219,781	292,808	358,878	332,729
Stauffer Chemical	180,395	170,588	161,786	219,067
First Metals Bank	180,376	164,426	187,243	
Butte Plaza	145,391	139,057	150,399	117,935
International Business Machines IBM	73,350	66,740	63,664	64,589
Burlington Northern	66,866	62,215	64,325	73,589
Milwaukee Road	64,895	57,935		60,378
Fairmont Hot Springs			82,457	102,012

III. CONCLUSIONS

The preconstruction baseline data (phase I) for the socioeconomic impact study of the MHD CDIF project in Butte, Montana has been completed. It is important to establish accurate and complete baseline data in order to assess the socioeconomic impacts of the MHD CDIF. The community profile presents the demographic picture of Butte, an inventory of the physical and social infrastructure, and the economic baseline of the community. It is apparent, after examining these aspects over a number of years, that the urban growth, typical of other cities in Montana and other states, has not occurred in Butte. One reason for this appears to be the decline in the mining industry which is a major employer and taxpayer in the area. However, there are indications of an upward shift, or at least a stabilizing point, of trends in Butte-Silver Bow.

The existing facilities appear to be adequate, and although the area has been considered economically depressed and deteriorating, new businesses are opening, and several construction projects are proceeding. The demographic situation of the area appears to be stabilizing after many years of decline, but the employment situation is in poor condition. Unemployment rates have been established at a 10 percent figure or higher. The economic stability of Butte is related directly to activities in the mining industry. Diversification is taking place, but change takes time.

The construction project profile includes the CDIF Specifications Report, the direct site improvement, and the CDIF construction schedule. It is important to understand the construction project and how that relates to the conditions in Butte. A construction project has an effect on a community by increasing employment, wages and incomes, and the number of people in the community. The full effect will not be realized until after the construction is completed. In order to fully assess the socioeconomic conditions relating to construction, all pertinent data must be analyzed. This includes the employees, wages, and materials used on the project. The multiplier effect is significant because those people affected directly will affect much of the entire community indirectly.

Through the presentation of the baseline data in this report, we have established the groundwork for monitoring and assessing the environmental and socioeconomic impacts of the MHD CDIF. We have looked at and analyzed past and present conditions in order to prepare for assessing future developments. Adequate and complete baseline information should serve as the foundation for the continuing project. In order to understand what impact the MHD CDIF will have on Butte, it is necessary to understand what the community is like before the CDIF is completed.

It is the conclusion of this project that the MHD CDIF will have a positive effect on the Butte area. Butte is in need of financial stimulus, employment opportunities, and diversification of its economic base. The MHD CDIF offers these opportunities with possibilities for future related developments. The effects of the MHD CDIF project in Butte will be far reaching, and will continue to play an important role in Butte's future.

REFERENCES

Publications

Butte Local Development Corporation Report, Fall 1973.

Butte-RUDAT, Regional Planning and Design Committee for Butte-Silver Bow, City-County Planning Board, June 1972.

Butte-Silver Bow General Plan, Butte-Silver Bow, City-County Planning Board and Public Works Department, November 1975 (updated).

CBD Relocation and New Town Project, Butte, Montana, Butte Forward, Inc., September 1973.

Central Business District Development Program, Butte, Montana, Final Report, The American City Corporation, Columbia, Maryland, February 1976.

Chamber of Commerce Monthly Newsletters, Butte-Silver Bow, Montana, 1975 through September 1977.

Characteristics of the Population - Montana, part 28, United States Department of Commerce, Bureau of Census, 1970 Census of Population.

Charter for Unification of Butte-Silver Bow Government, November 2, 1976.

City-County Land Use Plan, City-County Planning Board, Butte-Silver Bow, 1971.

Community Facilities Plan, Department of Urban and Regional Planning, Kansas City, Missouri, June 1971.

Community Renewal Program Report, Marshall, Kaplan, Gans, and Kahn, December 1972.

Comprehensive Demonstration Plan, Butte Model Cities, 1971.

County and City Data Book 1972, United States Department of Commerce, Bureau of Census, 1972.

County Business Patterns - Montana, 1974, United States Department of Commerce, Bureau of Census.

County Profile, Silver Bow County, Division of Research and Information Systems, Department of Community Affairs, June 1975.

"Energy Resources Development in Wyoming's Powder River Basin," An Assessment of Potential Social and Economic Impacts, Dr. Roger A. Matson and Jeanette B. Studer, Water Resources Research Institute, University of Wyoming, and United States Department of Agriculture, Economic Research Service, May 1974.

Environmental Impact Statement, East Decker and North Extension Mines, Decker Coal Company, Big Horn County, Montana, Vol. 1, Vol. 2, United States Department of the Interior, Geological Survey, State of Montana, Department of State Lands, June 1977.

Minerals Yearbook, U.S. Bureau of Mines, Department of the Interior.

Feasibility and Action Plan for Establishing Transportation and Distribution Facilities in Butte, Montana, T.A.P. Inc., Bozeman, Montana, February 1971.

Governmental Resource Study, Columbian Research Institute, Portland, Oregon, February 1973.

Housing Stock, Housing Conditions and Low Income and Minority Households in Butte, Paul Miller, Institute for Social Research, University of Montana, February 1977.

Livestock Report of the State Department of Revenue, Montana State Department of Revenue, 1975 to 1976.

Manpower Information for Affirmative Action Programs 1974-1975, Employment Security Division, Montana Department of Labor.

Minerals Yearbook, United States Department of the Interior, Bureau of Mines, 1970 through 1974 (pre-print).

Mining Industry in Montana 1976, Employment Security Division, Department of Labor and Industry, July 1977.

Montana Agricultural Statistics 1967, 1970, 1974, 1976, Montana Department of Agriculture and Statistical Reporting Service, United States Department of Agriculture.

Montana Data Book, Department of Planning and Economic Development, Helena, Montana 1970.

Montana Department of Social and Rehabilitation Services Statistical Reports, 1977.

Montana Economic Indicators, Employment Security Division, Department of Labor and Industry, February 1977.

Montana Employment and Labor Force, Monthly Reports, 1971 through August 1977, Employment Security Division, Department of Labor and Industry.

Montana MHD CDIF Siting Survey, Industrial Park Site, Gilbert and Associates Inc., December 1975.

Montana Property Taxation 1977, Montana Taxpayers Association.

Montana Standard, "Top Taxpayers of Silver Bow County", February 8, 1974, February 23, 1975, March 7, 1976, and February 20, 1977.

Population and Economic Inventory and Analysis, Butte-Silver Bow, City-County Planning Board, Revised 1975.

Population Estimates and Projections, United States Department of Commerce, Bureau of Census, May 1977.

Preliminary Description of the Existing Environment, Gettysburg Prospect, Richland and Dawson Counties, Montana, Montana College of Mineral Science and Technology, April 1977.

Project Plan, Headwaters RC&D Montana, United States Department of Agriculture, Soil Conservation Service, 1974.

Report of the State Department of Revenue 1974-1976, 1972-1974, 1970-1972, 1968-1970, 1966-1968, Montana Department of Revenue.

Sales Marketing and Management, Survey of Buying Power, July 1975, July 1976, July 1977.

Social Effects and Other Changes Attributed to Industrial Developments, Institute for Social Research, University of Montana, Missoula, Montana, June 1974.

Social and Socioeconomic Aspects of Coal Development in Our Part of the Nation, Dr. Raymond Gold, Institute for Social Research, University of Montana, Missoula, Montana, December 1976.

Socioeconomic Impacts of Coal Development in Nebraska, Warren G. White, Nebraska State Office of Planning and Programming, Lincoln, Nebraska, October 1973.

Study of Social Structure and Service Impact of Proposed Expansion of Decker Coal Company Strip Mine Operations, Dr. Raymond Gold, Institute for Social Research, Missoula, Montana University of Montana, September 1975.

Suggestions for Organization and Transition Butte-Silver Bow, Columbian Research Institute, Portland, Oregon, April 1977.

Survey of Current Business, United States Department of Commerce, Bureau of Economic Analysis, Vol. 57, No. 4, April 1977.

Census Reports 1950, 1960, 1970, 1972, 1974, U.S. Bureau of Census.

Wage and Salary Survey, Employment Security Division, Montana Department of Labor and Industry, October 1976.

Organizations and Personal Contacts

Anaconda Company, Public Relations Department, Butte, Montana, August 1977.

Amtrak, Butte, Montana, July 1977.

Burlington Northern Railroad, Butte, Montana, July 1977.

Butte Aero Sales, Butte, Montana, July 1977.

Butte-Anaconda and Pacific Railroad, Butte, Montana, August 1977.

Butte Local Development Corporation, Butte, Montana, June-September 1977.

Butte-Silver Bow Fire Department, Butte, Montana, July 1977.

Butte-Silver Bow Law Enforcement Agency, Butte, Montana, August 1977.

Butte-Silver Bow Public Works Department, Butte, Montana, June-September 1977.

Butte-Silver Bow Recreation Department, Butte, Montana, July 1977.

Butte-Silver Bow Treasurer, Butte, Montana, August 1977.

Chamber of Commerce, Butte, Montana, June-September 1977.

City County Planning Board, Butte-Silver Bow, Butte, Montana, June-September 1977.

D.A. Davidson and Company, Butte, Montana, August 1977.

Diocese of Helena, Superintendent of Schools, Butte, Montana, September 1977.

Greyhound Bus Lines, Butte, Montana, July 1977.

Intermountain Transportation Company, Butte, Montana, July 1977.

Miller, Paul, Sociology Department, University of Montana, Missoula, Montana, June-September 1977.

Milwaukee Road Railroad, Butte, Montana, August 1977.

Montana Department of Agriculture, Helena, Montana, August 1977.

Montana Department of Community Affairs, Helena, Montana, June-September 1977.

Montana Department of Education, Helena, Montana, August-September 1977.

Montana Department of Health and Environmental Sciences, Helena, Montana, June-September 1977.

Montana Department of Institutions, Helena, Montana, August 1977.

Montana Department of Labor and Industry, Helena, Montana, August 1977.

Montana Department of Livestock, Helena, Montana, September 1977.

Montana Department of Revenue, Helena, Montana, August-September 1977.

Montana Department of Social and Rehabilitative Services, Helena, Montana, July 1977.

Montana International Trade Commission, Butte, Montana, June 1977.

Mountain Bell, Commercial Forecasting, Butte, Montana, July 1977.

Northwest Orient Airlines, Butte, Montana, August 1977.

Public Service Commission, Helena, Montana, August 1977.

Registrar of Motor Vehicles, Deer Lodge, Montana, July 1977.

St. James Community Hospital, Butte, Montana, July 1977.

School District No. 1, Butte, Montana, Superintendent of Schools,
July-September, 1977.

Silver Bow General Hospital, Butte, Montana, July 1977.

Statements of Condition - Butte Banks, Butte, Montana, July-August 1977.

Montana Bank
First National Bank
Miner's Bank of Montana
First Metals Bank and Trust Company
Prudential Federal Savings

Union Pacific Railroad, Butte, Montana, August 1977.

Western Airlines, Butte, Montana, July 1977.

Western Analysis, Helena, Montana, July-August 1977.

Construction Project Profile

Steve Armknecht, Industrial Relations Manager, Kaiser Engineers, MHD CDIF,
Butte, Montana, June-August 1977.

MERDI Personnel, CDIF Division, CDIF Staffing Plan, Butte, Montana, July 1977.

ERDA MHD Program, Montana Component Development and Integration Facility
Design Requirements, Butte, Montana, July 1976, Revised May 4, 1977.

Taylor-McDonnell Construction Company, Butte, Montana, August 1977.

Jim Gilman Excavating, Incorporated, Butte, Montana, July 1977.

Stratford Steel Structures, Incorporated, Butte, Montana, July 1977.

Butte Plumbing and Heating, Butte, Montana, July 1977

Toljan Electric, Butte, Montana, July 1977.

Richard Schirk, Project Engineer, U.S. Department of Energy, Butte Project
Office, DOE, Butte, Montana, July-September 1977.

Historical Reference

- Connally, Christopher P., The Devil Learns to Vote, New York, Cowice
Friede, 1938.
- Heinze, F. Augustus, The Political Situation in Montana, 1900-1902,
Butte, Montana, 1902

- McNelis, Sarah, Copper King at War, University of Montana, Missoula, Montana, 1968.
- Raymer, Robert G., Montana, The Land and the People, I. Chicago, The Lewis Publishing Company, 1930.
- Ostberg, J.H., Sketches of Old Butte, Butte, Montana, 1972.
- O'Farrell, P.A., Butte: Its Copper Mines and Copper Kings, New York, James A. Rogers, 1890.

APPENDIX
COMMENT OF CENSUS METHODOLOGY

APPENDIX *

Comment on Census Methodology

Introduction

In view of the immense manpower requirements of a general census, as well as the great expense involved, it is necessary to utilize less precise measures of population between actual head counts. Such estimation and allocation procedures could best be described as more of an "art" than a "science." This, of course, should not imply that intercensus population data is not useful, but rather that such information should be regarded as an estimate as opposed to a true figure. As is the case with all estimates, some error is bound to be induced.

Census Procedures

In order to better understand the nature of county or city level population estimates, it would be instructive to briefly review the characteristics of national and state estimating techniques. It is important to be aware that the entire process represents a series of allocations from the top down. First of all, estimates of the population of the United States are made. This control total[†] is the product of expected births minus expected deaths, plus net migration which is reported by the Bureau of Immigration. Further adjustments are then made for overseas military population, including dependents. The net change is then added to the 1970 benchmark figure to estimate current levels. The national estimate can safely be assumed to be an accurate estimate of the true value.

The next step in the procedure represents an allocation of the national total to the individual states and territories. For sparsely populated states, such as Montana, the allocated estimate is assumed by the Bureau of the Census to be no more accurate than ± 1.5 per cent. Obviously, this confidence range

* Report prepared for MERDI by Western Analysis, Helena, Montana, August 1977.

implies that any further estimates and allocations (i.e., county or city) could be no more precise (on average) than the control total.

This state level estimate is a simple average of the three following methods.

1. Component Method II employs vital statistics to measure natural increase and uses elementary school enrollment (or school census) data and expected survivors to this age group as a basis for estimating net civilian migration to the population under age 65.
2. The Ratio-Correlation Method is a multiple correlation estimating equation applied to the changes in the distribution of four different series of data to estimate changes in the distribution of the individual State populations. The four series used are (a) elementary school enrollment, (b) automobile registration, (c) Federal income tax returns, and (d) a work force series (sum of (1) the annual average number of nonagricultural wage and salary jobs, (2) the number of unemployed, and (3) the number of agricultural workers in the three winter months).
- 3) Administrative Records Method in this instance uses individual Federal income tax returns to measure civilian interstate migration. Immigration from abroad to the individual States is estimated from data on intended State of residence of aliens as published in the annual reports of the Immigration and Naturalization Service. The other components of civilian population change - births, deaths, and the net movement between the Armed Forces and civilian population - are identical with Component Method II.

Although the individual estimates of the three separate methods are not released by the Census Bureau, it would be safe to assume that overall variance is on the order of ± 1.5 per cent. For example, the range of individual estimates for Montana in 1976 probably would range between 742,000 and 764,000. As a result, caution must be exercised when analyzing short term changes, i.e., 746,000 in 1975 and 753,000 in 1976. ¹

Once control totals are established for the state a similar allocation procedure is employed to determine county level estimates such that the county sum adds to the state control figure. In this effort, the following methods are utilized.

¹ For a summary of accuracy evaluation see Census series P-25, No. 520 and P-26, No. 21.

1. The Regression (ratio-correlation) method. In the Regression method a multiple regression equation is used to relate changes in a number of different data series to change in population distribution. The series of data used in the Regression method for Montana are: three-year sums of resident births (X_1), three-year sums of resident deaths (X_2), elementary school enrollment in grades 1 through 8 plus elementary special and elementary ungraded (X_3), and automobile registrations (X_4). The prediction equation for Montana for the 1970's is given by

$$\hat{Y} = 0.1664 + 0.1566X_1 + 0.0486X_2 + 0.3787X_3 + 0.2376X_4$$

2. Component Method II. This method employs vital statistics to measure natural increase and school enrollment to measure net migration. The estimates made by the Census Bureau's Component Method II are specific to the civilian population under 65. To this population is added an estimate of the population 65 and over based on Medicare statistics and an estimate of the resident military population based on station strength statistics.

3. The Administrative Records method. This is a component method which uses individual Federal income tax returns to measure civilian intercounty migration and reported birth and death statistics to estimate natural increase. The tax returns are matched by Social Security number in the base year and the estimate year to determine the number of persons whose county of residence changed during the period. A net migration rate based on exemptions claimed by the matched cases is then applied to the total population. This estimate is made specific to the civilian population under 65 by excluding from the migration computations data relating to persons 65 years and over. These estimates are then combined with independent estimates of the population 65 and over based on Medicare statistics. The other components of civilian population change - births, deaths, immigration, and the net movement between the Armed Forces and civilian population - are identical with Component Method II (described above).

Once again, the estimates from the individual methods are not available for release. Tests against 1970 data using the preceeding county methods indicated an average error of approximately 5 per cent (disregarding sign) for all counties.

Additionally, the level of certainty for a given year's estimate would very likely decline over time, since the estimates are further removed from the base period, i.e., the actual 1970 count. Unfortunately, it is not possible to objectively determine the real effect of changing state-county relationships between such variables as automobile registrations, school enrollment, tax returns, etc. Comparisons can only be made after the fact, that is, after the 1980 Census, or after a special count.

In order to determine municipal estimates in a consistent manner, further allocations become necessary.

To estimate the population of each county subarea a component procedure is used, with each of the components of population change (births, deaths, and net migration) estimated separately. To the 1970 census population base for each area the following components are added:

1. An estimate of natural increase (the excess of births over deaths) based on reported birth and death statistics or on estimated figures where reported data were not available;
2. An estimate of net migration developed from individual administrative records; and
3. An estimate of change to "special" populations not accounted for in (1) and (2).

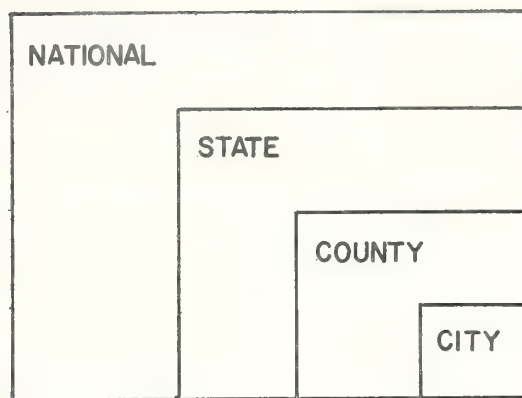
For counties this estimates procedure was modified to relate to the population under 65 years of age, with change in the population 65 years and over estimated by adding change in reported Medicare enrollment, 1970 to 1973, to the 1970 census count 65 years and over. Medicare enrollment statistics were not available below the county level for application of this modification to incorporated places and MCD's.

The 1970 population base is the 1970 census count updated to reflect all population "corrections" made to the data after the initial tabulations as well as changes due to new incorporations, disincorporations, and annexations.

Tests of the accuracy of the procedure against 1970 data revealed an average difference of approximately 3 per cent. Additional tests based on 1973 special census data resulted in an error of approximately 5 per cent.

Summary

The following diagram may serve useful in summarizing the entire procedure.



When potential error is induced during each step in this four step process, each additional estimate becomes less and less precise. In the extreme, but rather unlikely case, compounding error could result in variances as great as plus or minus 10 per cent for municipalities. This extreme case, however, would require that all estimating steps would be high (or all low) and rules out offsetting errors which will no doubt frequently occur. A more reasonable tolerance range for population estimates for a city the size of Butte would be more on the order of plus or minus 5 per cent. A 5 per cent range based on the 1975 Butte estimate (Census Bureau) will help illustrate this variance.

High	=	24,650
1975 Census (Butte)	=	23,476
Low	=	22,302

If the 5 per cent assumption is correct, variations in estimates of less than 5 per cent from an actual head count may not represent actual changes. In brief, while error is likely to be present in such estimates, the estimates are accurate as possible given the amount of consistent proxy data which is available to the Census Bureau.

The Selection of Independent Proxies

Introduction

This section of the report is designed to explain the selection of proxy variables which are included in the MERDI estimating technique as well as in the Census procedure. The discussion is geared toward an explanation of the general sources of error as a result of the selection of independent variables used in estimating population. The MERDI algorithms presented later are a product of an attempt to reduce error and provide independent proxies which are current and easily obtainable.

Commonly Used Proxies

In addition to school enrollment data, births and deaths, automobile registrations, and federal tax returns, several other types of proxies are occasionally used by planners to estimate population levels. These proxies include:

- telephone, power, and water hookups
- number of possible mail deliveries (Post Office)
- state tax returns
- employment levels
- housing inventories/permits
- social security recipients
- new car sales

In terms of these additional proxies only state tax returns and employment levels were available at both the county and state level. It is important to have both sets of information as a safeguard against changes in state/county ratios created by variations in general economic activity or long term trend changes. For example, an increase in the number of tax returns filed in an individual county may or may not indicate a change in population depending upon similar changes in the state return total. Simply stated, an absolute increase (at the county level) in a proxy variable could be countered with a relative population decline if the county's share decreased. Of course, this problem

influences all proxy variables, which requires that both sets of information be used in combination.

Water, telephone, and electrical hookups as well as housing inventories data were not complete enough to be useful even as a separate series. Additionally, new car sales and building permits proved to be too volatile as a result of variations in mortgage rates and credit availability.

Estimation Variation

The MERDI estimation procedure relies on four independent proxies which are listed below:

- 1) Auto registration
- 2) School enrollment
- 3) Employment
- 4) Tax returns

Each of the proxies is used in a separate estimation equation to determine four independent estimates of population. The sum of these estimates is then added to a natural growth estimate (i.e., a 1 year, sex cohort model) and a simple average taken to determine a yearly estimate of population. (Each of these methods is explained in detail later.) The correspondence between the MERDI method and the Census estimate is shown in the following Table

Table 5
Comparison of Estimates

	Census	MERDI
1970	41,981	41,981
1971	42,900	42,000
1972	42,100	42,100
1973	43,300	44,100
1974	43,100	43,800
1975	43,000	42,700
1976	41,000 P	41,500
1977	N/A	40,900

Sources: Census P-25, Western Analysis

The overall variance of the MERDI estimates is similar to that of the Census

estimating technique, i.e., plus or minus approximately 2500. Each of the individual methods will now be explained.

The Employment Method

The employment method utilizes a regression equation to estimate total county population as a function of basic and nonbasic employment levels. The following data and categories were employed in the county estimates. See Table 6.

County level employment data were fitted to 1970 Census data for all 56 Montana counties to produce the following equation.

$$\text{Population} = 5932 + 2.88 (\text{Basic Employment}) + 1.98 (\text{Nonbasic Employment})$$

$t = 15.28 \qquad \qquad \qquad t = 25.61$

$$\bar{R}^2 = .99 \qquad F = 9732.32 \qquad \text{Standard Error} = 1838.31$$

The county equations were individually adjusted using a gravity flow model (Huff variation) to account for the influence of market centers, i.e., larger centers which have a relatively higher concentration of nonbasic employment

In general, the equation performs well, but should not be employed during strike years. The effect of a strike, or layoff on employment should be regarded as temporary, having no population effect. This problem is illustrated in Table 7.

Table 7
Comparison of Employment Based Estimates

	Census Estimate	Employment Estimate
1970	41,981	41,389
1971	42,900	38,788 (strike)
1972	42,100	41,744
1973	43,300	43,735
1974	43,100	44,490
1975	43,000	41,930
1976	41,100	38,000

In reality the 1971 Anaconda strike had little true population impact, whereas the 1975 closing of underground mining operations probably resulted in a major

Table 6

Silver Bow County Employment

Sector	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976
Basic	4327	3504	4357	4821	3938	4855	5059	5009	4107	3576
Agriculture	213	207	206	209	211	220	220	222	187	189
Mining	2762	2031	2784	3325	2531	3436	3609	3570	2768	2168
Manufacturing	689	592	711	676	651	625	681	691	599	644
Federal Govt.	414	433	426	425	381	398	373	368	400	425
Rail	249	241	230	186	164	176	176	158	153	150
Non Basic	10421	10046	10278	10895	10866	11025	11734	12188	12207	11278
Construction	762	591	567	456	481	490	586	471	340	383
Trans., Comm. and Utilities	589	621	563	544	603	597	628	675	700	725
Trade	3007	2984	3126	3287	3352	3530	3652	3780	3770	3452
Finance	473	456	471	502	473	455	444	431	371	399
Services	2578	2353	2508	2964	2699	2627	3004	3352	3390	2568
State and Local Govt.	1653	1671	1667	1740	1811	1819	1917	1972	2111	2250
Self Employed	1359	1370	1376	1402	1447	1507	1503	1507	1525	1550
Total	14748	13550	14635	15716	14804	15880	16793	17197	16314	14904

Sources: Bureau of Economic Analysis, U.S. Department of Commerce

The 1975 and 1976 data were derived by Western Analysis from
Employment Security records

population decline. However, it should be kept in mind that the equation is static in nature. Simply stated, this means that the equation predicts an immediate response to a change in employment.

In order to allow for time lag adjustments several versions of this model were developed. These variations attempted to allow for adjustments over time as well as changes in female labor force participation rates and basic service ratios. Unfortunately, while these experiments were more intuitively appealing, the estimates showed far greater variation and therefore were abandoned.

In summary, this procedure should be used with greater caution than the other four techniques. The advantages of the method are twofold. Firstly, the data necessary to drive the equation is current and easily accessible. And secondly, the approach allows for the general level of economic activity to influence the population base.

School Enrollment Method

School enrollment data is also easily obtainable and current, for both the state, city and county. During the period 1970-76, total school enrollment at the state level declined by 3.5 percent while the state's population increased by 8.4 percent. During the same period enrollment in Silver Bow county and Butte fell by 9.2 percent and 9.4 percent respectively. The use of simple ratios between state and county population and enrollment would imply that Silver Bow county population levels fell by 21.7 percent from 1970. Obviously, declines of this order did not actually occur and as a result simple ratios can not be used for county population estimates. The reason for this problem, however, is clear.

The following technique avoids this problem by comparing school enrollment data with the expected number of individuals of school age in the absence of

any population changes, i.e., migration. In order to estimate the number of school age individuals (i.e., 6-18 years) a cohort/survival process is used. This model begins with the 1970 census age distribution data for both the state and county, expected patterns in birth and death rates, and computes a total eligible school age figure for both the county and state respectively. These cohort groups are shown below.

Table 8
Cohort Estimates/Enrollment Data

	<u>Silver Bow</u>		<u>State</u>	
	School Enrollment	Cohort	School Enrollment	Cohort
1976	8720	13,286	170,552	236,345
1975	9157	13,484	171,788	238,627
1974	9787	13,804	172,158	241,475
1973	10027	14,095	172,045	244,369
1972	9253	14,425	172,350	247,449
1971	9368	14,688	173,757	250,305
1970	9599	14,989	176,712	253,101

Sources: Western Analysis; Dept. of Public Instruction

It is important to note that this version of the enrollment method is not tied to state level control totals as is the Census techniques, but rather constitutes a simple ratio of cohort group, enrollment, and county population beginning in 1970.

This equation is given by adjusting actual and expected enrollment to the 1970 county population. That is,

$$\frac{\text{Cohort}}{\text{School Enrollment}} = \frac{\text{Adjustment}}{\text{Population}}$$

or

$$\text{Population} = (\text{Adjustment}/(\text{Cohort}/\text{Actual}))$$

Starting with the 1970 base we have

$$41,981 = \frac{65,554}{\frac{14,989}{9599}}$$

When using this approach, the following estimates were derived. Census estimates are shown for comparison.

Table 9
Silver Bow Population Estimates Comparisons

	Census Estimate	School Enrollment Estimate
1970	41,981	41,981
1971	42,900	41,800
1972	42,100	42,050
1973	43,300	46,634
1974	43,100	46,478
1975	43,000	44,518
1976	41,100	43,025

Once again, the effects of mining activity are apparent, specifically the increases in 1973 and 1974 and the decline starting in 1975.

In order to continue to use this method the following future cohort estimates are provided for Silver Bow County.

1977	13,164
1978	13,076
1979	13,055

As a note of explanation concerning long term school enrollment levels and cohort groups, unless the level of employment continues to fall in the county, the level of enrollment will probably stabilize after 1980 and perhaps even increase slightly. This demographic effect at the state level is occurring now.

Natural Growth Method

The natural growth method simply calculates the difference between expected births and deaths. This figure is then added to the 1970 population base. Again, a cohort survival process is employed and the results are shown below along with the actual reported increase.

Table 10

Natural Growth - Silver Bow County

	Cohort Estimate	Actual
1970	N/A	42,071
1971	42,122	42,211
1972	42,270	42,386
1973	42,431	42,453
1974	42,606	42,645
1975	42,791	42,685
1976	43,031	42,750

Source: Western Analysis; Montana Dept. of Health and Environmental Sciences

The differences between the estimated values and actual figures are not large enough to draw any definitive conclusions. The projected natural growth increases for the county, assuming a zero migration rate are given below.

1977	43,325
1978	43,669
1979	44,068
1980	44,520

If the Census and MERDI estimates are realistic, the implication is that the level of outmigration since 1975 has sharply increased. The implied level of migration since 1975 is approximately 2000 at the county level.

Tax Returns Method

This method utilizes state tax returns at the county and state level to estimate population. That is, simple county/state ratios are used in combination with state population estimates to determine county population. This tax return data is shown below.

Table 11

State Tax Returns

	State	Silver Bow
1975	345,704	18,970
1974	251,665	14,354
1973	N/A	N/A
1972	N/A	N/A
1971	298,628	17,878
1970	286,358	17,577

The equation shown below was used to produce the following estimates.

$$\frac{\text{Population Silver Bow County}}{\text{Silver Bow County}} = \frac{\text{Silver Bow Registrations}}{\text{State Registrations}} \times 1.03284 \times \text{State Population}$$

Table 14

Auto Registration Estimates Silver Bow County

	Census Estimate	Registration Estimate
1970	41,981	41,981
1971	42,900	42,100
1972	42,100	42,287
1973	43,300	43,697
1974	43,100	44,107
1975	43,000	43,942
1976	41,100	N/A

This technique was found to be inappropriate for 1976 due to an error in data collection and/or processing. Roughly 50,000 records were not included in the state total during the later part of the year. The effect of this error largely explains which Census estimates for Montana were lower than anticipated for 1976. Unfortunately, all of the records which were not recorded late in the year were reported early in 1977. This will probably have the effect of biasing the 1977 estimates upward.

General Conclusions and Observations

The combination (average) of all five methods produces an estimate which in general verifies the accuracy of the Census estimates. When data is missing or inappropriate, that particular estimate should be dropped from the procedure.

The MERDI estimate for 1976 Silver Bow population is probably superior to the preliminary Census figure since the Census estimate is based on partial data. By the same token, the 1977 projection for Silver Bow county (MERDI method) is based only on employment and natural growth and therefore is subject to greater error.

Note: Data was not available for 1976, 1973, or 1972 and therefore, this technique was not included in the average, i.e., only four of the five possible estimates were used.

Source: Montana Dept. of Revenue

This method employs the following equation:

$$.98492 \times (\text{State Population}) \times \frac{\text{Silver Bow Returns}}{\text{State Returns}} = \text{Silver Bow Population}$$

The results are shown below.

Table 12
Tax Returns/Population Estimates

	Census Estimate	Tax Return Estimate
1970	41,981	41,981
1971	42,900	41,829
1972	42,100	N/A
1973	43,300	N/A
1974	43,100	41,402
1975	43,000	40,318

Automobile Registration Method

This method also uses simple ratios and state control totals to estimate county population based in the following data.

Table 13
Passenger Car Registrations

	State	Silver Bow
1970	319,476	18,700
1971	335,216	19,261
1972	382,046	21,843
1973	363,970	21,100
1974	370,500	21,468
1975	384,482	21,927
1976	341,311*	21,549

Note: data collection error

Source: Montana Dept. of Justice

Both the Census and MERDI estimates indicate that the area grew slightly from 1970-1975 with most if not all of the growth occurring in 1973 and 1974. Since 1975 it appears as if county population has declined significantly. Of course, this can not be stated with complete confidence due to accuracy of the two approaches. In effect, this decline only appears likely. Additionally, these conclusions are generally supported by variations in building permits and postal registrations. But, as indicated earlier such estimates are more "art than science."

Since very limited information is available on the city of Butte by itself, only simple ratios can be used to estimate city population. In spite of the problems imposed by such a method, the distortions are probably minor since most of Silver Bow's population resides in Butte and presumably the city has followed the county trend.

In so far as the relationship between county and state proxy relationships may change over time, future use of the overall method should be supplemented with both discretion and careful judgment.

